

PUBLIC VERSION

**UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.**

**Before Charles E. Bullock
Administrative Law Judge**

In the Matter of

**CERTAIN BASEBAND PROCESSOR CHIPS AND
CHIPSETS, TRANSMITTER AND RECEIVER
(RADIO) CHIPS, POWER CONTROL CHIPS, AND
PRODUCTS CONTAINING SAME, INCLUDING
CELLULAR TELEPHONE HANDSETS**

Inv. No. 337-TA-543

POSTHEARING BRIEF OF THE COMMISSION INVESTIGATIVE STAFF

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I. INTRODUCTION

A. Procedural History

On March 19, 2005, Broadcom Corporation ("Broadcom") of Irvine, California, filed a Complaint with the Commission (Docket No. 2430) pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337. Supplements to the Complaint were filed on June 7 and 10, 2005. The Complaint named Qualcomm Incorporated ("Qualcomm") as the sole respondent and alleged violations of Section 337 based on the importation and sale of certain baseband¹ processor chips and chipsets,² transmitter and receiver (radio) chips, power control chips, and products containing same, including cellular telephone handsets, by reason of infringement of:

- ▶ claims 1-5, 7, 8, 13, 14, and 16-19 of U.S. Patent No. 6,374,311 ("the '311 patent");
- ▶ claims 1, 4, 8, 9, 11, 14, and 17-24 of U.S. Patent No. 6,714,983 ("the '983 patent");
- ▶ claim 2 of U.S. Patent No. 5,682,379 ("the '379 patent");
- ▶ claims 8-11 and 13 of U.S. Patent No. 6,359,872 ("the '872 patent"); and
- ▶ claims 33, 35, and 38 of U.S. Patent No. 6,583,675 ("the '675 patent").

The Commission instituted this investigation on June 21, 2005 by publication of the Notice of Investigation. 70 Fed. Reg. 35,707 (June 21, 2005). The current target date for completion of

¹ Baseband refers to "the frequency band occupied by the aggregate of the transmitted signals used to modulate a carrier, before they combine with a carrier in the modulation process." Baseband signal refers to "a signal that is not modulated onto a carrier." Modern Dictionary of Electronics at 60 (7th ed., 1999).

² A chipset is "a set of integrated circuits that supplies all or most of the circuitry needed to build a functional item of electronic equipment." Modern Dictionary of Electronics at 113 (7th ed., 1999); Nettleton, Tr. at 611.

the investigation is December 21, 2006. Order No. 2 (June 21, 2005); Order No. 4 (October 26, 2005); Order No. 28 (February 15, 2006).

On February 14, 2006, Broadcom filed an unopposed motion to withdraw its allegations regarding the '379 and '872 patents. Order No. 26 (February 15, 2006) granted Broadcom's motion terminating the investigation as to those patents. Commission Notice of Decision Not to Review an ID Terminating the Investigation in Part (February 27, 2006). Hence, only the '675, '983, and '311 patents remain at issue in the investigation.

On January 24, 2006, the Judge issued an Initial Determination (Order No. 19) granting Broadcom's unopposed motion for summary determination that the economic prong of the domestic industry requirement has been satisfied for each of the five patents in dispute. Notice of Commission Decision Not to Review an Initial Determination Granting Complainant's Motion for Summary Determination That It Satisfies the Economic Prong of the Domestic Industry Requirement (February 17, 2006).

On January 31, 2006, Cellco Partnership d/b/a Verizon Wireless ("Verizon") filed a motion to intervene in the investigation for the limited purpose of presenting evidence related to remedy and bonding. LG Electronics Mobilecomm U.S.A., Inc. ("LG") filed a similar motion on February 2, 2006. On February 3, 2006, Motorola, Inc. ("Motorola") and Kyocera Wireless Corp. ("Kyocera") each filed motions to intervene in order to present evidence regarding the appropriate remedy. Sprint Nextel Corp. ("Sprint") and Samsung Electronics Co., Ltd. ("Samsung") filed similar motions on February 8, 2006 and February 10, 2006, respectively. On February 21, 2006, the Judge issued an Initial Determination (Order No. 27) bifurcating the hearing into liability and

remedy phases, granting the movants' requests to intervene in the subsequent remedy phase of the investigation and extending the target date for completion of the investigation from September 21, 2006 to December 21, 2006. Notice of Commission Determination Not to Review an ID Granting-in-Part Various Motions to Intervene and Extending the Target Date for Completion of the Investigation (March 17, 2006).

Verizon, on February 22, 2006, further filed an emergency motion to (i) intervene in the liability phase of the investigation and suspend the proceedings to allow Verizon to prepare its case and (ii) disqualify Wilmer Cutler Pickering Hale and Dorr, LLP as counsel for Broadcom. In Order No. 29 (March 9, 2006), the Judge denied Verizon's motion. Verizon petitioned the Commission for review of the Judge's decision with respect to intervention in the liability phase. This petition remains pending before the Commission.³

B. The Parties

Complainant Broadcom provides complete system-on-a-chip solutions and related hardware and software applications for the broadband (GMS/GPRS) communications market. Complaint ¶ 8, p. 3; ¶ 19, p. 6; ¶ 24, p. 8; ¶ 27, p. 9.

Respondent Qualcomm, located in San Diego, California, develops, has manufactured, and sells integrated circuits, including baseband processor chips and chipsets and radio chips, for use in wireless communications and multimedia functions. Complaint ¶¶ 11-13, pp. 4-5.

³ The Judge denied Verizon's motion for a certification for interlocutory review of his denial of Verizon's disqualification request in Order No. 30 (March 28, 2006).

C. Summary

The evidence presented at trial demonstrates that: (i) claims 33 and 35 of the '675 patent as properly construed are not invalid or infringed; (ii) claims 1, 4, 8, 9, and 11 of the '983 patent as properly construed are not invalid and are infringed by the accused Qualcomm products; and (iii) claims 1-5, 7-8, 14 and 16-19 of the '311 patent as properly construed are not invalid and are infringed by the accused Qualcomm products. Qualcomm has imported into the United States, has sold to third parties who later imported into the United States, or has sold within the United States after importation all of the accused products. JX-121C. Hence, the importation of infringing Qualcomm chips and chipsets as well as products containing them, including telephone handsets, violates Section 337.

D. Overview of the Technology

1. The '675 Patent

The '675 patent relates to "gain control in a phase lock loop, and more specifically to phase lock loop gain control using scaled unit current sources." JX-4 at 1:9-11; CX-1337C at 8; CX-1662C at 12; RX-839 at 8. A phase lock loop, or "PLL," is a closed loop feedback system in which a portion of the output is compared to a reference input in order to make the output phase identical to the reference phase and the output frequency identical to or a multiple of the reference frequency. SX-1 at 532; RX-839C at 4; CX-1662C at 8; *see* CDX-5.

A basic PLL consists of a phase detector, charge pump, loop filter, variable capacitance oscillator ("VCO") and variable divider ("1/N"). SX-1 at 532; RX-839C at 4; CX-1662C at 8; *see* CDX-5. The phase detector, also called a phase discriminator or phase comparator, compares the

phase of the reference frequency to the phase of the feedback signal from the output. SX-1 at 531-32; RX-839C at 4; CX-1662C at 8; *see* CDX-4. Ideally, the two signals should match exactly but if they do not, the phase detector generates error signals that are proportional to the phase differential between the output and reference signals. RX-839C at 4; CX-1662C at 8. In turn, current pulses are generated by the charge pump that are proportional to the error signals. RX-839C at 4; CX-1662C at 8. The charge pump output adds or subtracts charge from the loop filter which converts the charge pump signal into a smooth analog control voltage that serves as the control input to the VCO. RX-839C at 4-5; CX-1662C at 8. The waveform produced by the VCO is the output of the PLL and its frequency is tuned by varying the input voltage from the loop filter. SX-1 at 835; RX-839C at 5; CX-1662C at 8, 11. A portion of the output signal is divided by the variable divider to generate a lower frequency signal that is fed back into the phase detector to compare the output signal to an input reference. RX-839C at 5; CX-1662C at 8. This "loop" continues until the output and input signals match and it can be said that the PLL has achieved phase lock.⁴ CX-1662C at 8. In radios, televisions, cell phones, and other wireless devices, PLLs are used to upconvert and downconvert signals in transmitters and receivers. JX-4 at 1:13-15; CX-1662C at 5, 9.

As the '675 patent explains, a resonant-tuned VCO is typically used in a PLL to generate the output signal. JX-4 at 1: 33-34. The resonant-tuned VCO typically consists of an active

⁴ "Phase lock" is defined as "the technique of making the phase of an oscillator signal follow exactly the phase of a reference signal by comparing the phases between the two signals to adjust the frequency of the reference oscillator." SX-1 at 552.

device and a resonant LC circuit. JX-4 at 1:35-36; *see also* SX-1 at 835. The LC circuit contains multiple fixed capacitors that can be switched in or out of the circuit, a varactor diode, and at least one inductor.⁵ JX-4 at 1:43-45, 2:14-17; RX-839C at 10; CX-1662C at 11; *see* CDX-128. Coarse tuning of the VCO output signal is performed by switching in one or more of the fixed capacitors. JX-4 at 1:45-51, 2:19-22; CX-1662C at 11. In the invention of the '675 patent, this coarse tuning is effectuated by means of a capacitor control signal. JX-4 at 2:17-22. The VCO output is fine tuned by varying the voltage across the varactor diode. JX-4 at 1:51-54, 2:22-25; CX-1662C at 11. Both tuning mechanisms change the capacitance of the circuit and therefore change the resonant frequency of the LC circuit. JX-4 at 1:54-56.

Gain is the amount an output increases in response to an input. CX-1662C at 11; SX-1 at 314. The '675 patent defines VCO gain as the output frequency shift per unit change in the varactor tuning voltage. JX-4 at 1:59-60; CX-1662C at 11. The gain of the VCO changes with respect to the fixed capacitors which are switched into the resonant LC circuit. JX-4 at 1:60-64. Variation in the VCO gain effects the gain of the entire PLL and if uncontrolled can increase the phase noise or instability of the system as a whole.⁶ JX-4 at 1:64-2:4; Gutierrez, Tr. at 1396.

⁵ A varactor or varactor diode is a semiconductor device in which the capacitance varies with the applied voltage. Modern Dictionary of Electronics at 824 (7th ed., 1999); *see also* CX-1662C at 10 (variable capacitor).

⁶ Phase noise is defined a "a measure of the random phase instability of a signal." Dictionary of Modern Electronics at 553 (7th ed., 1999).

2. The '983 and '311 Patents

The '983 and '311 patents relate to wireless telecommunications systems, which are radio data networks that facilitate communication between host computers and radio frequency (RF) terminals. Specifically, the '983 patent stems from research related to mobile device capabilities and power management; the '311 patent addresses concerns of network integrity and optimal efficiency.

In the late 1980s, researchers at Norand developed mobile RF handsets that utilized a modular design to combat the problem of reconfiguring equipment in order to communicate on the plethora of different and exclusive network communication protocols, or air interfaces, found in different business environments. CX-1339 at 3, 5. An air interface is the wireless link between a handset and a base station, and enables the wireless handset and the base station to communicate with each other. *Id.* at 7. A base station is a fixed part of a cellular network that acts as the central radio transceiver. CX-1667C at 2. Circuits within the handset run software that allows message traffic to move from the handset to a point on the network such as the base station. CX-1339 at 7.

With a modular design of the '983 patent, interchangeable radio cards (or modules) can be used to allow a mobile device to communicate on different protocols. A radio card is a set of circuits that receives a low-level RF signal and amplifies, processes and converts it to a digital data stream. *Id.* at 5. Thus, a device could include a first radio card for use with a proprietary communication protocol for one application, and a second radio card for use on a spread spectrum protocol for another application. *Id.* The ability to communicate using different protocols eliminated the costly and cumbersome need to carry multiple handsets and further minimizes the

possibility of loss of service when a user travels beyond a coverage area or tries to communicate with different networks in the same geographic region.

Since mobile handheld devices are generally battery powered, power consumption or battery draw is an important feature. Norand also considered power-saving circuitry in its design for handheld computing devices. The '983 patent addresses power-saving by reducing the frequency of scanning for access points or searching for an opportunity to communicate with the network when roaming between coverage areas or disconnecting an RF link with one access point in favor of connecting with a different access point. JX-5 at 42:65-67; CX-1339 at 8. An access point is a node that manages both membership in and communication with a network segment. CX-1338C at 8. The '311 patent addresses another power-saving feature - - allowing the mobile computing devices or terminal nodes to "sleep" during extended periods and awaken only periodically to check for messages. JX-3 at 19:19-25. Using these features, power consumption can be reduced and battery life extended.

E. The Patents at Issue

1. The '675 Patent

On June 24, 2003, the Patent Office issued to Ramon A. Gomez the '675 patent, entitled "Apparatus and Method for Phase Lock Loop Gain Control Using Unit Current Sources." JX-4. The '675 patent issued from U.S. Patent Application Serial No. 09/811,611 (filed March 20, 2001), after being published by the Patent Office as Publication No. 2002/0135428 A1 on September 26, 2002. JX-4. Dr. Gomez assigned all right, title, and interest in the '675 patent to Broadcom. CX-1233; CX-1337C at 8. The invention of the '675 patent is an improved gain

compensator circuit. CX-1662C at 12; RX-839C at 8. The patent discloses a particular type of gain compensation circuit used in a phase lock loop ("PLL"). Gain is the change in output frequency of the PLL as a function of which capacitors are switched in and out to tune the PLL to a different band of frequencies. CX-1337C at 8-9; RX-839C at 8. The circuit claimed in the '675 patent attempts to compensate for variation in the gain to increase the stability of the PLL over a range of operating frequencies.

2. The '983 and '311 Patents

On March 30, 2004, the U.S. Patent Office issued the '983 patent, entitled "Modular, Portable Data Processing Terminal For Use In A Communication Network." JX-5. Steven E. Koenck, Patrick W. Kinney, Ronald L. Mahany, Robert C. Meier and Philip Miller are the named inventors on the '983 patent. *Id.* The '983 patent is assigned to Broadcom. Complaint ¶ 34, p. 11 and Exhibit 10. The '983 patent discloses a modular mobile computing device and a method of using that mobile computing device to communicate with a network using two or more different wireless technologies. CX-1339C at 7. The '983 patent also relates to extending battery life in a mobile computing device by operating the device in a reduced power mode. CX-1339C at 7.

The '311 patent, entitled "Communication Network Having a Plurality of Bridging Nodes Which Transmit A Beacon To Terminal Nodes In Power Saving State That It Has Messages Awaiting Delivery," issued on April 16, 2002. JX-3. Ronald L. Mahany, Robert C. Meier and Ronald E. Luse are the named inventors on the '311 patent. *Id.* The '311 patent is assigned to Broadcom. Complaint ¶ 43, p. 14 and Exhibit 12. Like the '983 patent, the '311 patent describes a power-saving state for a mobile computing device wherein the mobile computing device can

power down or "sleep" when it is not actively transmitting or receiving data. The system relies upon the mobile computing device "waking up" to transmit a message or to monitor a predetermined periodic beacon sent by a base station to inform the mobile computing device if there are any messages to be delivered.

F. The Qualcomm Accused Products

1. Products Accused of Infringing the '675 Patent

The Qualcomm products accused of infringing the '675 patent are the RFT6100, RFT6102, RFT6120, RFT6150, RFT6170, RTR6200, RTR6250, and RTR6300 chips. Broadcom Prehearing Brief ("BCAB") at 159 (January 30, 2006); Qualcomm Prehearing Brief ("QCAB") at 9 (January 30, 2006); CX-1662C at 4. "RFT" chips are radio transmitter chips that upconvert baseband signals to radio frequency and amplify those signals for transmission. CX-1662C at 24. "RTR" chips are radio transceiver chips that transmit and receive radio signals. *Id.* Transceiver chips upconvert baseband signals to radio frequency and then amplify those signals for transmission as well as downconvert radio frequency signals to baseband frequency for processing. *Id.*

2. Products Accused of Infringing the '983 Patent

Broadcom has accused the Qualcomm MSM6200, MSM6225, MSM6245, MSM6250, MSM6255, MSM6260, MSM6275, MSM6280, MSM6300, MSM6500, MSM6550, MSM6800 and MSM7500 baseband processor chipsets of infringing the '983 patent.⁷ CX-1664C at 31.

⁷ On pages 37, 234, 236 and 489 of its Prehearing Brief, Broadcom alleges infringement by the MSM5500 chipset. However, Broadcom does not allege importation into the United States of the MSM5500 chipset, so a violation of Section 337 can not be found as to that product. (continued...)

Specifically, Broadcom accuses Qualcomm of infringing claims 1, 4, 8-11, and 17-24 of the '983 patent directly and indirectly, both by contributory and induced infringement. BCAB at 183; CX-1664C at 31.

3. Products Accused of Infringing the '311 Patent

Broadcom has accused the Qualcomm MSM 6500, MSM 6550, MSM 6800 and MSM7500 baseband processor chipsets of infringing the '311 patent through each chip's support and implementation of the EV-DO standard.⁸ BCAB at 217. Broadcom accuses Qualcomm of infringing claims 1-5, 8-9, 11, 14, and 17-24 of the '311 patent directly and indirectly both by contributory and induced infringement. BCAB at 217-48; CX-1664C at 87.

G. The Broadcom Domestic Industry Products

1. Domestic Industry Products for the '675 Patent

Broadcom's BCM3440 digital satellite tuner chip practices claim 33 of the '675 patent. CX-1662C at 4; BCAB at 38. According to Dr. Gomez, the BCM 3440 is "the embodiment" of the invention of the '675 patent. Gomez, Tr. at 936; CX-1337C at 10. The BCM3440 is a tuner chip that is found in the digital receiver and decoder of a set-top box in satellite television systems. CX-1290C at 3; CX-1337C at 11; Gomez, Tr. 951. The receiver and decoder in the set-top box receives a satellite broadcast feed from the antenna, separates each channel, and translates the

⁷(...continued)

Moreover, Broadcom's expert has not provided an opinion with respect to infringement by the MSM5500 chipset. CX-1664C at 31.

⁸ On pages 37, 234, 236 and 489 of its Prehearing Brief, Broadcom again alleges infringement by the MSM5500 chipset. *See* n.7, *supra*.

digital signal into a signal that the television can show. CX-1337C at 11. As part of that function, the BCM3440 chip downconverts input satellite broadcast signals in the 950-2150 Hz range to lower-frequency baseband signals. CX-1290C at 3; CX-1337C at 11.

The BCM3440 tuner chip is sold in the United States and is incorporated into set-top boxes [] Gomez, Tr. at 951.

2. Domestic Industry Products for the ‘983 and ‘311 Patents

Broadcom claims that its BCM2132, BCM2121, BCM2133, and BCM2140 baseband processor products practice at least claim 1 of the ‘983 patent. BCAB at 38. The BCM2132 and BCM2133 chips are “Single-Chip” baseband processors that support GSM, GPRS, and EDGE, and include interfaces for microphone, speaker, display, and keypad. CX-1667C at 4, 9; CX-1219C; CX-332C; CX-1613C. The BCM2121 chip is a Single-Chip processor that supports only GSM and GPRS. CX-1667C at 8. The BCM2140 is a product being sampled that supports wideband code division multiple access baseband (w-CDMA). CX-1667C at 9; CX-1712C.

Broadcom claims that its BCM4317, BCM4318E, BCM4320, and BCM4712 chips practice the ‘311 patent when combined with other components of the claimed system, for example during testing by Broadcom. BCAB at 39; *see* CX-1338C at 5-7. Specifically, the BCM4317 chip is a Single-Chip transceiver for an IEEE 802.11b (Wi-Fi) system. CX-1338C at 4; CX-1268C. The BCM4318E chip is a second-generation Single-Chip wireless LAN (local area network) solution and complies with the IEEE 802.11a, b, and g specifications. CX-1338C at 7; CX-1513C. The BCM4320 product is a "system-on-a-chip" wireless LAN solution that can be

used as a wireless card that connects to a device through a cable.⁹ CX-1338C at 7; CX-1521C. Finally, the BCM4712 chip is a processor chip specifically for the router market that supports IEEE 802.11 wireless and Ethernet capability. CX-1338C at 8; CX-1623C.

II. JURISDICTION

The Commission has personal over Qualcomm and subject matter jurisdiction over the accused products at issue in this investigation. BCAB at 42-43; QCAB at 11.

III. CLAIM CONSTRUCTION

A. Legal Principles

Claim construction is a matter of law exclusively for the court and, on appeal, is subject to *de novo* review. *Cybor Corp. v. FAS Technologies Inc.*, 138 F.3d 1448, 1455-56, 46 USPQ2d 1169, 1174 (Fed. Cir. 1998) (*en banc*); *Markman v. Westview Instruments Inc.*, 52 F.3d 969, 976, 34 USPQ2d 1321, 1322 (Fed. Cir. 1995) (*en banc*), *aff'd*, 116 S. Ct. 1384, 38 USPQ2d 1461 (1996). The ordinary and customary meaning of the language of the claim to one of ordinary skill in the art at the time of the invention is the starting point for the analysis. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366, 62 USPQ2d 1658 (Fed. Cir. 2002). In construing a claim, the specification and prosecution history may be used to interpret what the patentee meant by words or phrases in the claim and to give necessary context. *Markman*, 52 F.3d at 979, 34

⁹ "System-on-a-chip" indicates that a microprocessor and memory are incorporated onto the chip and the chip itself is capable of running all wireless functions. CX-1338C at 7. This allows wireless functionality to be added to a device without burdening the host processor. *Id.*

USPQ2d at 1329; *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582, 39 USPQ2d 1573, 1576 (Fed. Cir. 1996). As recently explained by the Federal Circuit:

Claim language generally carries the ordinary meaning of the words in their normal usage in the field of invention" at the time of invention. *Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1367, 66 USPQ2d 1631 (Fed. Cir. 2003). Thus, to determine claim meaning, a court immerses itself in the specification, the prior art, and other evidence, such as the understanding of skilled artisans at the time of invention, to discern the context and normal usage of the words in the patent claim. *See, e.g., Hoechst Celanese Corp. v. BP Chems., Ltd.*, 78 F.3d 1575, 1579, 38 USPQ2d 1126 (Fed. Cir., 1996). Dictionaries and scientific treatises may also help supply the pertinent context and usage for claim construction. *Tex. Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1201, 1202, 64 USPQ2d 1812 (Fed. Cir. 2002); *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1309, 51 USPQ2d 1161 (Fed. Cir. 1999). Of course, a court must resist relying on any of these sources in a vacuum because they each influence the understanding of one of skill in the art at the time of invention - - the standard for assessing claim meaning. *DeMarini Sports, Inc. v. Worth, Inc.*, 239 F.3d 1314, 1324, 57 USPQ2d 1889 (Fed. Cir. 2001).

Alloc, Inc., v. Int'l Trade Comm'n, 342 F.3d 1361, 1368, 68 USPQ2d 1161, 1165 (Fed. Cir. 2003).

Indeed, although extrinsic evidence such as dictionaries can shed useful light on the meaning of claim language, the intrinsic record, including the specification and prosecution history, is the most significant evidence and thus determinative for interpreting the legally operative meaning of patent claim language. *Phillips v. A.W.H. Corp.*, 415 F.3d 1303, 75 USPQ2d 1321 (Fed. Cir. 2005).

However, the specification and prosecution history should not “enlarge, diminish or vary” the limitations of the claims. *Phillips*, 415 F.3d at 1323; *Alloc*, 68 USPQ2d at 1167; *Vitronics*, 90 F.3d at 1582-83, 29 USPQ2d at 1576-77; *Markman*, 52 F.3d at 979-980, 34 USPQ2d at 1329-30; *Intel Corp. v. U.S.I.T.C.*, 946 F.2d 821, 836, 20 USPQ2d 111 (Fed. Cir. 1991) (“*Intel Corp.*”)

(“Where a specification does not *require* a limitation, that limitation should not be read from the specification into the claims.”) (emphasis in original) (internal citations omitted). Nonetheless, the specification and prosecution history may indicate that the meaning of a claim should be restricted. For example, the intrinsic evidence may indicate that the patentee acted as his own lexicographer and provided a special meaning to a claim term, or that the patentee limited the scope of the claims during prosecution. *CSS Fitness*, 288 F.3d at 1366; *Watts v. XL Sys. Inc.*, 232 F.3d 877, 880-81, 56 USPQ2d 1836 (Fed. Cir. 2000); *Bayer AG v. Elan Pharm. Research Corp.*, 212 F.3d 1241, 1252, 54 USPQ2d 1710 (Fed. Cir. 2000).

The balance between impermissibly importing limitations from the specification and using the specification to gain a proper understanding of the claim terms "turns on how the specification characterizes the invention." *Alloc*, 68 USPQ2d at 1167, citing *SunRace Roots Enters. Co. v. SRAM Corp.*, 336 F.3d 1298, 1305, 67 USPQ2d 1438 (Fed. Cir. 2003). As the Federal Circuit stated in *Alloc*:

[T]his court looks to whether the specification refers to a limitation only as part of less than all possible embodiments or whether the specification read as a whole suggests that the very character of the invention requires the limitation to be a part of every embodiment. For example, it is impermissible to read the one and only disclosed embodiment into a claim without other indicia that the patentee so intended to limit the invention. *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1327, 63 USPQ2d 1374 (Fed. Cir. 2002). On the other hand, where the specification makes clear at various points that the claimed invention is narrower than the claim language might imply, it is entirely permissible and proper to limit the claims. *SciMedLife Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1345, 58 USPQ2d 1059 (Fed. Cir. 2001).

Alloc, 68 USPQ2d at 1167.

B. The '675 Patent

1. The Inventions Disclosed in the '675 Patent

The '675 patent describes the invention as a circuit that compensates for gain in a phase lock loop ("PLL"), particularly by using scaled unit current sources. JX-4, 1:9-11; 2:12-14; CX-1337C at 8. Controlling the gain allows the PLL to be operated with greater stability and less signal interference over a wider range of operating frequencies. CX-1337C at 9. The application exemplified in the '675 patent was a television tuner.

The patent describes the invention as a gain compensator that adjusts for the variable VCO gain by generating a reference charge pump current for the PLL based on information that is carried in the capacitor control signal. JX-4 at 2:28-31. Consequently, the gain compensator circuit is able to *simultaneously* adjust the charge pump current to maintain a stable overall PLL gain as the fixed capacitors are added to or subtracted from the LC circuit of the VCO. JX-4 at 2:31-34.

The gain compensator of the invention includes "gain compensator cells" that correspond to particular VCOs and that can be selected by a VCO control signal to be switched into the PLL at any time. JX-4 at 2:35-39 and Fig. 8; CX-1662C at 15. Each "gain compensator cell" has a set of unit current sources, wherein each unit current source substantially replicates (or copies) a

reference scale current.¹⁰ JX-4 at 2:39-42 and Fig. 9; CX-1662C at 16; RX-839C at 8-9. The reference scale current is generated based on a PLL control signal. JX-4 at 3:1-3.

A patent is written for the person of ordinary skill in the art at the time of the invention. *In re Hayes Microcomputer Prods., Inc. Patent Litigation*, 982 F2d 157, 1533, 25 USPQ2d 1241, 1245 (Fed. Cir. 1992). According to Broadcom, the person of ordinary skill in the art would have a Bachelor's or Masters degree in electrical engineering and a few years of experience in the design of analog circuits. CX-1662C at 17. On the other hand, Qualcomm contends that the person of ordinary skill in the art has a Masters or doctoral degree and at least one year of experience designing PLL circuits. RX-839 at 7. Qualcomm's position is undermined by the fact that immediately after receiving his Masters' degree in electrical engineering, Jeremy Dunworth was assigned the task of designing the PLL circuit that is contained in almost all of the accused products. Dunworth, Tr. at 1262-63, 1270, 1275-76. Having designed that PLL circuit, Mr. Dunworth was not asked to continue working in PLL design and in fact, the PLL circuit in the accused products is the only PLL circuit that Mr. Dunworth has ever designed. Dunworth, Tr. 1275. Thus, Qualcomm's position that the ordinarily skilled person in this art at the time of the invention would have had special expertise in PLL design is not supported. Both expert and factual testimony supports a conclusion that the person of ordinary skill in the art would have a Masters degree in electrical engineering with some experience in analog circuit design.

¹⁰ Whether a particular set of unit current sources is turned on or not is controlled by switches that are linked to the capacitor control signal that switches the fixed capacitors in or out of the circuit. RX-839C at 9.

2. The File History of the '675 Patent

The application for the '675 patent was filed on March 20, 2001 in the name of Ramon Gomez. The original application contained 33 claims with claims 1-22 directed toward a gain compensator circuit and claims 23-33 directed toward a method of compensating the gain of a phase lock loop. JX-9 at BCMITC0000073500-73506. Application claims 1, 15, 23 and 27 were independent claims. As filed, independent application claim 1 read:

A gain compensator circuit that determines a reference pump current for a charge pump in a phase lock loop (PLL) comprising:

a plurality of unit current sources that are arranged into at least one group, said group responsive to a capacitor control signal and generating a portion of the reference pump current when said group is activated, wherein said capacitor control signal also controls a corresponding fixed capacitor; and

means for scaling said unit current sources responsive to a phase lock loop control signal.

JX-9 at BCMITC0000073500.¹¹ Independent application claim 27 read:

¹¹ Independent application claim 15 read:

A gain compensator circuit that determines a reference pump current for a charge pump in a phase lock loop (PLL) comprising:

a plurality of unit current sources that are arranged into at least one group, said group generating a portion of the reference pump current when said group is activated;

a voltage generator that generates a gate voltage based on a PLL control signal; and

a switch that is connected to said group of unit current sources, wherein said switch is controlled by a corresponding capacitor

(continued...)

A method of compensating the gain of a phase lock loop (PLL) comprising the steps of:

- (1) receiving at least one capacitor control signal that controls a corresponding fixed capacitor in a VCO tuning circuit;
- (2) generating a reference scale current;
- (3) activating a group of unit current sources based on said capacitor control signal;
- (4) replicating said reference scale current a number of times in said activated group, wherein the number of times said reference scale current is replicated is based on said fixed capacitor that is controlled by said capacitor control signal; and
- (5) summing together said replicated currents to form a reference charge pump current for said PLL.

JX-9 at BCMITC0000073504-73505.¹²

¹¹(...continued)

control signal that also controls a fixed capacitor in a VCO tuning circuit, wherein said switch connects said gate voltage to said corresponding group of unit current sources according to said capacitor control signal.

JX-9 at BCMITC0000073502.

¹² Independent application claim 23 read:

A method of compensating the gain of a phase lock loop (PLL) comprising the steps of:

- (1) generating a reference scale current;
- (2) switching a fixed capacitor into a VCO tuning circuit that is part of a VCO to tune a frequency of said VCO;
- (3) replicating said reference scale current a number of times when

(continued...)

On April 17, 2002, the Patent Examiner rejected application claims 1-11, 15, 23-28 and 31-33 as anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,625,325 ("Rotzoll") and claims 12-13, 19-22, 29 and 30 as obvious in light of the combination of Rotzoll with Shearer *et al.*, U.S. Patent No. 5,126,692, under 35 U.S.C. §103. JX-9 at BCMITC0000073598-73599. The Examiner characterized Rotzoll as disclosing "a phase lock loop (PLL) with VCO that has gain compensation circuitry including unit current sources controlled by the means of scaling the current." JX-9 at BCMITC0000073600.

In response to the rejection, on August 19, 2002, the applicant amended each independent claim to recite the requirement of simultaneous scaling of the unit current sources generating at least a portion of the reference pump current based on a PLL control signal representative of one or more PLL characteristics. For example, amended claim 1 read:

A gain compensator circuit that determines a reference pump current for a charge pump in a phase lock loop (PLL) comprising:

a plurality of unit current sources that are arranged into at least one group, said group responsive to a capacitor control signal and generating a portion of the reference pump current when said group is activated, wherein said capacitor control signal also controls a corresponding fixed capacitor; and

¹²(...continued)

said fixed capacitor is switched-in to said VCO tuning circuit, wherein the number of times said reference scale current is replicated is based on said fixed capacitor; and

(4) contributing said replicated currents to a reference charge pump current for said PLL.

JX-9 at BCMITC0000073504.

means for simultaneously scaling said unit current sources responsive to a PLL [phase lock loop] control signal that is representative of at least one of a reference frequency, a loop bandwidth, and a damping factor of said PLL.

JX-9 at BCMITC0000073836 (underscoring provided to show the language that was added).¹³

¹³ Claim 15 was amended to read:

A gain compensator circuit that determines a reference pump current for a charge pump in a phase lock loop (PLL) comprising:

a plurality of unit current sources that are arranged into at least one group, said group generating a portion of the reference pump current when said group is activated;

a voltage generator that generates a gate voltage based on a PLL control signal; and

a switch that is connected to said group of unit current sources, wherein said switch is controlled by a corresponding capacitor control signal that also controls a fixed capacitor in a VCO tuning circuit, wherein said switch connects said gate voltage to said corresponding group of unit current sources according to said capacitor control signal;

wherein said voltage generator includes:

a current scaler that generates a reference scale current according to a PLL control signal, and

means for generating said gate voltage based on said reference scale current.

JX-9 at BCMITC0000073836-73837. The specification makes clear that a current scaler (804) that sets the reference scale current based on a PLL control signal *simultaneously* adjusts *all* of the current sources 906 (that are in a selected group 904) to account for changing PLL characteristics. JX-9 at BCMITC0000073494-73495 and BCMITC0000073823 (emphasis added).

Independent claim 23 was cancelled and the features of claim 23 were added to claim 24 to make newly independent claim 24.¹⁴ Independent claim 27 was amended to read:

A method of compensating the gain of a phase lock loop (PLL) comprising the steps of:

- (1) receiving at least one capacitor control signal that controls a corresponding fixed capacitor in a VCO tuning circuit;
- (2) generating a reference scale current;
- (3) activating a group of unit current sources based on said capacitor control signal;
- (4) replicating said reference scale current a number of times in said activated group, wherein the number of times said reference

¹⁴ Claim 24, as amended, read:

A method of compensating the gain of a phase lock loop (PLL) comprising the steps of:

- (1) generating a reference scale current;
- (2) switching a fixed capacitor into a VCO tuning circuit that is part of a VCO to tune a frequency of said VCO;
- (3) replicating said reference scale current a number of times when said fixed capacitor is switched-in to said VCO tuning circuit, wherein the number of times said reference scale current is replicated is based on said fixed capacitor;
- (4) contributing said replicated currents to a reference charge pump current for said PLL; and
- (5) adjusting said reference scale current based on a PLL control signal that indicates characteristics of said PLL.

JX-9 at BCMITC0000073837-73838.

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scale current is replicated is based on said fixed capacitor that is controlled by said capacitor control signal;

(5) summing together said replicated currents to form a reference charge pump current for said PLL, and

(6) adjusting said reference scale current based on a PLL control signal that is representative of characteristics of the PLL, and thereby simultaneously adjusting said replicated currents that form said reference pump current according to said characteristics of the PLL.

JX-9 at BCMITC0000073838.

According to the patent applicant, claim 1 was amended to convey that in the claimed invention "the unit current sources are *simultaneously* scaled according to a *phase lock loop control signal that is representative of either a desired damping factor, reference frequency or loop bandwidth* of the PLL." JX-9 at BCMITC0000073830 (emphasis in original). It was asserted that this simultaneous scaling of the unit current sources was not found in Rotzoll because in Rotzoll the output (904) was not fed to all the programmable current amplifiers (94, 95, 96).¹⁵ JX-9 at BCMITC0000073831. Further, the applicant argued that "[e]ven assuming Rotzoll could scale the current amplifiers 94, 95, and 96 simultaneously, Rotzoll does not teach or suggest scaling based on" reference frequency, loop bandwidth, or a damping factor of the PLL. *Id.* Thus, the applicant asserted that "Rotzoll does not teach each and every feature of amended claim 1, or

¹⁵ The applicant also distinguished Rotzoll on the basis that in the applicant's invention the unit current sources could be arranged arbitrarily in any combination of groups whereas in Rotzoll they had to be arranged in a polynomial relationship (such that the output of each "group" generates the x^2 , x and c components to form an output analog current corresponding to $(x^2 + x + c)$). This made the claimed invention more flexible. JX-9 at BCMITC0000073830-73831.

the corresponding dependent claims."¹⁶ *Id.* Applicant argued that claims 15, 24, and 27 had each been amended to include the current scaling featured discussed with reference to claim 1 and accordingly, claims 15, 24, and 27 along with their respective dependent claims were allowable for at least the same reasons as discussed with respect to claim 1. JX-9 at BCMITC0000073832.

On September 12, 2002, the Examiner allowed amended claims 1-9, 11-19, 21, 22, 24-30 and 32-35. JX-9 at BCMITC0000073843. The Examiner stated that "[n]one of the cited references discloses nor suggests the claimed invention including a gain compensator circuit that [is] responsive to both a capacitor control signal and a PLL control signal, which determines a reference pump current for a charge pump in a PLL, as set forth in the [amended] claims." JX-9 at BCMITC0000073843. On December 13, 2002, the patent applicant requested continued examination and filed a preliminary amendment adding claim 37 that ultimately issued as claim 33, which has been asserted in this investigation, and claim 39 that ultimately issued as claim 35, which is also asserted in this investigation. The applicant argued:

Claims 1-9, 11-19, 21-22, 24-30, and 32-35 were previously allowed. New claims 36-43 are thought to be allowable for the same reasons.

JX-9 at BCMITC0000073850.

On January 30, 2003, applicant submitted a First Supplemental Information Disclosure Statement accompanied by a Declaration of Inventor Gomez and a copy of a Broadcom press

¹⁶ The applicant represented to the PTO that all of the independent claims were amended to include the scaling feature discussed above with reference to claim 1 and for this reason, all of the independent claims (and all of the respective dependent claims) were allowable "for at least the same reasons as discussed above for claim 1." JX-9 at BCMITC0000073832. The applicant never provided any independent reasons to support the patentability of any of the other claims.

release to allow the Patent Office to consider "certain activities related to the development of the present invention." JX-9 at BCMITC0000073897-73904. Specifically, Broadcom disclosed a December 6, 1999 press release announcing the BCM 3400 line of integrated circuit chips and stating that "[t]he BCM3415 chip, the first product in the CM3400 family, is . . . available priced at \$10 in sample quantities." JX-9 at BCMITC0000073903.

Inventor Gomez declared that "multiple versions of the BCM 3415 were designed and sampled during the development of the BCM 3415." JX-9 at BCMITC0000073897. The BCM 3415-A1 was the version of the chip available at the time of Broadcom's press release. According to Dr. Gomez, the gain compensator for the PLL in the BCM 3415-A1 included:

. . . a plurality of unit current sources arranged into multiple groups. Each group of unit current sources are [sic] responsive to a corresponding capacitor control signal and generate [sic] a portion of the reference pump current when the group is activated wherein the capacitor control signal also controls a corresponding fixed capacitor.

The BCM 3415-A1 did not include the feature of simultaneously scaling the unit current sources responsive to a PLL control signal that represents characteristics of the PLL (hereinafter known as the "scaling feature"). The PLL characteristics of the scaling feature can include for example, a reference frequency, a loop bandwidth, or a damping factor of the PLL.

JX-9 at BCMITC0000073898. Hence, consistent with the arguments made distinguishing the claimed invention from Rotzoll in the amendment on August 19, 2002, Dr. Gomez in his January 2003 declaration distinguished the claimed invention from the prior BCM 3415-A1 chip based on the presence or absence of simultaneous scaling of the unit current sources responsive to a PLL control signal. Dr. Gomez made it clear to the Patent Office that the scaling feature was not included in a chip until the design of the BCM 3415-B0 chip. *Id.* Further, Dr. Gomez averred that

the possible distribution of this chip more than a year before the March 20, 2001 filing date of the patent application was limited to the distribution of a reference board design to evaluation groups (not customers) which were customarily subject to a non-disclosure agreement. JX-9 at BCMITC0000073898-73899. Without further comment, the Examiner issued a Notice of Allowability for claims 1-9, 11-19, 21, 22, 24-30, and 32-35 and newly added claims 36-43 on February 7, 2003. JX-9 at BCMITC0000073855.

Based upon the entire prosecution history, it is clear that the patent applicant disavowed any subject matter that did not include the simultaneously scaling of unit current sources by a PLL control signal. The Supreme Court and the Federal Circuit have long applied the doctrine of prosecution disclaimer as a basic principle of claim construction to prevent patentees from recapturing specific meanings that were disclaimed during prosecution. *Omega Engineering, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323, 67 USPQ2d 1321 (Fed. Cir. 2003).¹⁷ Application of the doctrine serves the public notice function of the intrinsic evidence and protects the public's reliance on definitive statements made during prosecution. *Id.*, 334 F.3d at 1324; *Digital Biometrics, Inc. v. Identix, Inc.*, 149 F.3d 1335, 1347, 47 USPQ2d 1418, 1427 (Fed. Cir. 1998).

¹⁷ See *Schriber-Schroth Co. v. Cleveland Trust Co.*, 311 U.S. 211, 220-221, 61 S.Ct. 235 (1940); *Crawford v. Heysinger*, 123 U.S. 589, 602-04, 8 S.Ct. 399 (1887); *Goodyear Dental Vulcanite Co. v. Davis*, 102 U.S. 222, 227, (1880). The Federal Circuit has applied that doctrine as a basic principle of claim construction. *Texas Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1204, 64 USPQ2d 1812, 1819 (Fed. Cir. 2002); *Hockerson-Halberstadt Inc. v. Avia Group Int'l, Inc.*, 222 F.3d 951, 956, 55 USPQ2d 1487, 1491 (Fed. Cir. 2000); *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576-77, 34 USPQ2d 1673, 1676-77 (Fed. Cir. 1995); *Biodex Corp. v. Loredan Biomedical, Inc.*, 946 F.2d 850, 863, 20 USPQ2d 1252, 1262 (Fed. Cir. 1991); *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 452, 227 USPQ 293, 296 (Fed. Cir. 1985).

However, to balance public notice and the patentee's interest in broad patent coverage, the courts have only applied the doctrine where the disavowal of claim scope is clear and unambiguous.

Omega Engineering, 334 F.3d at 1324-26 (reviewing case law); *Gemstar-TV Guide Int'l Inc. v. U.S.I.T.C.*, 383 F.3d 1352, 1373-76, 72 USPQ2d 1609 (Fed. Cir. 2004) ("*Gemstar*"); *Sorensen v. U.S.I.T.C.*, 427 F.3d 1375, 1379, 77 USPQ2d 1083 (Fed. Cir. 2005).

The Staff expects Broadcom to argue that the applicant only asserted that the new claims (which ultimately issued) were allowable for the same specific reason that the Examiner cited in approving the prior claims and since the Examiner did not cite simultaneously scaling as a reason for allowance, the current claims should not be so limited. BCAB at 53; *see* JX-9 at BCMITC0000073843 and BCMITC0000073850. The patentee's statement that the new claims are "allowable for the same reasons" as the previously allowed claims is not so explicit and should not be limited to the reasons stated by the Examiner. In *Wang Laboratories*, the patent applicant argued that the continuation claims were "patentable for the same reasons" as the claims in the parent application. *Wang Laboratories Inc. v. Toshiba Corp.*, 933 F.2d 858, 867 n.11, 26 USPQ2d 1767 (Fed. Cir. 1993) ("*Wang Laboratories*"). The Federal Circuit did not look only to the notice of allowability in the parent application but reviewed *all* of the arguments the patentee made through the parent application to determine whether an estoppel applied to both the parent and the continuation patents.¹⁸ *Id.*, 933 F.2d at 867-68; *see Texas Instruments v. U.S. Int'l Trade*

¹⁸ *Wang Laboratories* involved prosecution history estoppel with respect to limitations on the doctrine of equivalents. However, as the Federal Circuit has recognized, the same standard for clear and unambiguous disclaimer is applied in the context of claim construction. (continued...)

Comm'n, 988 F.2d 1165, 1174 (Fed. Cir. 1993) (“Unmistakable assertions made by the applicant to the . . . [PTO] in support of patentability, whether or not required to secure allowance of the claim,” may work an estoppel); *Schriber-Schroth Co.*, 311 U.S. at 220-21 (“It is a rule of patent construction consistently observed that a claim in a patent as allowed must be read and interpreted with reference to claims that have been cancelled or rejected, and the claims allowed cannot by construction be read to cover what was thus eliminated from the patent.”). The Federal Circuit reiterated the legal concept that what is important for estoppel is the limitation that the patent applicant chooses to argue in defining or distinguishing its invention rather than the limitation that an Examiner ultimately accepts or that with hindsight could have been made:

A patent attorney is often faced with choices during a patent prosecution. . . . A patent attorney should not be able, however, to choose one course of action within the PTO with the anticipation that, if later checked, he or she can always choose an alternate course of prosecution in a trial before a federal judge.

Wang Laboratories, 993 F.2d 868, citing *Litton Sys., Inc. v. Whirlpool Corp.* 728 F.2d 1423, 1439, 221 USPQ 97, 107 (Fed. Cir. 1984).

Here, the applicant argued that its invention was distinct from the prior art Rotzoll patent because of the simultaneous scaling feature. JX-9 at BCMITC0000073830-31. While the fact that the Examiner did not mention that feature in his reasons for allowance of the prior claims is of no

¹⁸(...continued)

Omega Engineering, 334 F.3d at 1326 n.1, citing *Litton Sys., Inc. v. Honeywell, Inc.*, 140 F.3d 1449, 1458, 46 USPQ2d 1321, 1327 (Fed. Cir. 1998), and *Alpex Computer Corp. v. Nintendo Co., Ltd.*, 102 F.3d 1214, 1221, 40 USPQ2d 1667, 1673 (Fed. Cir. 1996) (“just as prosecution history estoppel may act to estop an equivalence argument under the doctrine of equivalents, positions taken before the PTO may bar an inconsistent position on claim construction.”).

legal significance, if this were the only statement of disavowal in the prosecution history, the question of prosecution disclaimer might be a close one. However, even after the new claims were added to the application, the applicant reiterated to the PTO that its invention was distinct from its prior BCM-3415-A1 chip because the prior chip did not include the simultaneous scaling feature of the invention. JX-9 at BCMITC0000073898. In the public record of the prosecution, Broadcom repeatedly characterized the invention as differing from the prior art by having a simultaneous scaling feature. In so doing, the applicants told the public and their competitors what the invention was not. Under long-standing Federal Circuit precedent, this statement is a deliberate surrender of claim scope. *See Omega Engineering* 334 F.3d at 1327. It is unmistakable because it is not subject to multiple interpretations but can only mean that the invention of the '675 has unit current sources that are simultaneously scaled according to a PLL control signal. *Id.* Broadcom should not now be able to reclaim subject matter that it voluntarily surrendered during prosecution through either a broad claim construction or the doctrine of equivalents.

The application issued as the '675 patent with claims 1-39 on June 24, 2003. Broadcom has asserted claims 33 and 35 in this investigation. Claim 33 recites:

A gain compensator circuit that determines a reference pump current for a charge pump in a phase lock loop (PLL) comprising:

a plurality of unit current sources that are arranged into at least one group, said group responsive to a capacitor control signal and generating a portion of the reference pump current when said group is activated, wherein said capacitor control signal also controls a corresponding fixed capacitor of a voltage controlled oscillator (VCO) in the PLL; and

a current mirror including one or more weighted current sources that generate a reference scale current responsive to a PLL control signal, the PLL control signal

representative of one or more characteristics of the PLL, each of said unit current sources generating a unit current proportional to said reference scale current, said unit currents summed together to form the reference pump current.

JX-4 at 18:4-20 (disputed claim terms are in italics). Claim 35 reads:

The gain compensator circuit of claim 33 wherein a number of said unit current sources in said group is determined so as to compensate for variable VCO gain that is caused when said corresponding fixed capacitor is switched into said VCO.

JX-4 at 18:25-29.

3. First Disputed Claim Term (Claims 33 and 35: “Reference Pump Current for a Charge Pump in a Phase Lock Loop”)

a. Definition of Claim Term

The private parties agree that "reference pump current" has no specialized meaning in the field of electrical engineering.¹⁹ The phrase appears in the preamble of claim 33 which states: "[a] gain compensator circuit that determines *a reference pump current for a charge pump in a phase lock loop* (PLL) comprising . . ." Broadcom argues that the person of ordinary skill in the art would understand this phrase to mean simply "a current for use in a charge pump in a PLL." CX-1662C at 18. Qualcomm argues that the person of ordinary skill in the art would understand this phrase to mean "a current input to the charge pump of a PLL that, together with the error signal provided to the charge pump, determines the magnitude of the output current provided by the charge pump over time." RX-839C at 12. The language does not require the particular charge

¹⁹ The Staff notes that the specification variously refers to this reference charge pump current as a "charge pump reference current," a "reference pump current," a "charge pump current," and a "reference charge pump current." JX-4 at abstract, 2:29-32, 8:29, 8:42-43; RX-839C at 12-13.

pump structure that Qualcomm's definition incorporates.²⁰ Thus, "reference pump current" should be construed as a current to be used in a charge pump contained in a phase lock loop.

b. Support for Interpretation

While Qualcomm's construction aptly describes the reference charge pump current produced by the sole embodiment described in the specification, the claims of the patent are not necessarily limited to that embodiment. *Phillips*, 415 F.3d at 1323, *citing Gemstar*, 383 F.3d at 1366. There is no reason to import a limitation as to the particular configuration of charge pump into claim 33 of the '675 patent. CX-1662C at 18. The language of the claim itself requires only that it be generated by the unit current sources and that it is used in a charge pump within a PLL.

4. Second Disputed Claim Term (Claims 33 and 35: "unit current source")

a. Definition of Claim Term

The phrase "unit current source" appears in both elements of claim 33:

. . . a plurality of *unit current sources* that are arranged into at least one group, said group responsive to a capacitor control signal and generating a portion of the reference pump current when said group is activated, wherein said capacitor control signal also controls a corresponding fixed capacitor of a voltage controlled oscillator (VCO) in the PLL; and

a current mirror including one or more weighted current sources that generate a reference scale current responsive to a PLL control signal, the PLL control signal representative of one or more characteristics of the PLL, each of said *unit current sources* generating a unit current proportional to said reference scale current, said unit currents summed together to form the reference pump current.

²⁰ The Staff does not believe that the parties' difference in claim construction with respect to "reference pump current" affects the outcome of any issue in this investigation.

JX-4 at 18:7-20. The parties agree that "unit current source" generally means circuitry that generates some arbitrary unit of current. SX-1 at 166; CX-1662C at 19; RX-839C at 13; *see also* BCAB at 58 n.12; QCAB at 21. The parties also appear to agree that the unit current sources must generate a current that is proportional to a reference scale current. RX-839C at 13; CX-1662C at 22. However, the parties dispute the manner in which the proportionality between the current generated by the unit current sources and the reference scale current must be established.

Qualcomm asserts that the unit current sources must replicate the reference current and further that the unit current sources must reside within a current mirror whose input is the reference scale current. RX-839C at 13. In essence, Qualcomm argues that the current mirror connects the input, the reference scale current, to the output, the scaled unit current sources. Gutierrez, Tr. at 1393. Broadcom admits that *each* of the unit current sources must generate a unit current that is proportional to the reference scale current.²¹ CX-1662C at 22. The Staff submits that the claim itself requires that *each* of the individual unit current sources must be simultaneously scaled (or made proportional) to the reference scale current before summing their outputs to form the reference pump current.

Hence, considering claim 33 in its entirety, the Staff submits that the meaning of "unit current source" is an individual unit of circuitry. Within the claim, *each* unit current source (i) is arranged in a group which can be activated by a capacitor control signal; (ii) when activated, is

²¹ As discussed below with respect to infringement, Broadcom appears to have modified its construction such that only the ultimate output of the unit current sources needs to be mathematically proportional to the reference scale current. CX-1664C at 54.

simultaneously scaled to the reference scale current; and (iii) when activated, generates at least a portion of the reference pump current.

b. Support for Interpretation

The Staff's construction is derived largely from the express language of claim 33 of the '675 patent, as informed by the prosecution history. As discussed above, the simultaneous scaling of each unit current source was repeatedly emphasized as the distinguishing characteristic of the invention throughout the file history. Broadcom's witnesses, Dr. Gomez and Dr. Milor, agree that claim 33 requires the simultaneous scaling of each of the unit current sources. Gomez, Tr. at 940-41, 943; Milor, Tr. at 1643.

The patent explains that the unit current sources are used to replicate a reference scale current and that by changing the reference scale current, the replicated current in each of the unit current sources is simultaneously adjusted so as to generate some proportion of the reference scale current. In describing an advantage of the invention, the '675 patent states "[s]ince the unit current sources are configured to replicate the reference scale current, all of the unit current sources can be *simultaneously* adjusted by changing the reference scale current." JX-4 at 3:6-9; Milor, Tr. at 563-64. Broadcom's expert, Dr. Milor testified:

Q: What does the reference scale current do?

A. The reference scale current is the current that does the scaling function, so it relates to the way the PLL control signal is implemented and goes and scales the unit current sources.

Milor, Tr. at 496. Thus, the reference scale current is responsive to the PLL control signal and it is the reference scale current that "scales the unit current sources." *Id.* The "scaling feature" of the

sole embodiment is implemented by the reference scale current setting the magnitude of a gate voltage that is then simultaneously distributed to each of the activated unit current sources. RX-839C at 9. Through setting the gate voltage input, the current generated by each unit current source will be equivalent or proportional to the reference scale current. RX-839C at 9. While the patent specification describes an embodiment where the reference scale current directly scales each of the unit current sources, there is no reason to import the term "directly" into claim 33. Thus, while each of the unit current sources must be simultaneously scaled so that its replicated or generated current is proportional to the reference scale current, claim 33 does not limit the signal effectuating the scaling.

Qualcomm's proposed construction would add the limitation that the reference scale current must be the input to the current mirror.²² RX-839C at 15-16; *see* QCAB at 22. Clearly this is one way to simultaneously scale the unit current sources responsive to a PLL control signal and one that is supported by the description of the sole embodiment in the '675 specification. That embodiment uses a current scaler 804 (*see* Figure 8) which contains the weighted current sources that generate a reference scale current 812 (and could constitute a first current mirror) and a

²² Qualcomm argues that the reference scale current must be the input to the current mirror, that the unit current sources must be contained in the current mirror, and that the output of the unit current sources forming the reference pump current be the output of the current mirror. Broadcom's argument that the structure of claim 33 dictates that "unit current sources" and the "current mirror" can be separate entities because they are listed in different paragraphs is undermined by the fact that the term "unit current sources" appears in both elements of the claim. CX-1662C at 22. Dr. Milor testified that the current mirror "is used to implement the scaling feature of the invention." CX-1978C at 5. Indeed, Dr. Milor testified "[t]he current mirror uses the reference scale current to perform a multiplication or division function, which makes the unit currents proportional to the reference scale current." CX-1978C at 5.

(second) current mirror which contains the unit current sources 906 (*see* Figure 9) that replicate or mirror the reference scale current 812 to generate a reference pump current 807 that is proportional to the reference scale current. JX-4 at 11:18-12:25; CX-1662C at 21. While Qualcomm's construction aptly describes the sole embodiment of the '675 patent and ensures that "each of said *unit current sources* generates a unit current proportional to said reference scale current" according to the claim, the language of claim 33 does not require that the reference scale current be the input to the current mirror. JX-4 at 11:55-59.

5. Third Disputed Claim Term (Claim 33: "PLL control signal")

a. Definition of Claim Term

The parties agree that "PLL control signal" does not have a specialized standard meaning to those of ordinary skill in the art. BCAB at 62; QCAB at 22. This phrase appears in claim 33 in the context of "a current mirror including one or more weighted current sources that generate a reference scale current responsive to a PLL control signal, the PLL control signal representative of one or more characteristics of the PLL." Broadcom argues that the claim itself defines a PLL control signal as a signal that is representative of one or more characteristics of a PLL. CX-1662C at 19. Qualcomm argues that "PLL control signal" is indefinite but to the extent that any definition could be applied a PLL control signal must set the value of bandwidth, damping factor, or input reference frequency of the PLL. RX-839C at 14-15. Qualcomm's indefiniteness argument will be addressed below. The claim language itself defines "PLL control signal" as a signal representative of one or more characteristics of a PLL. There is no reason to incorporate the examples from the

specification to limit the PLL's characteristics to bandwidth, damping factor, or input reference frequency.

b. Support for Interpretation

This interpretation stems from the language of the claim itself. Although Qualcomm cites to language in the specification from the preferred embodiment to support its argument that the PLL control signal must "set" the value of a PLL parameter, there is no reason here to limit claim 33 to the preferred embodiment. RX-839C at 14-15. The claim itself states that the PLL control signal is merely "representative of one or more characteristics of the PLL." The term "representative" means "one that exemplifies or typifies others of the same class." Webster's II New Riverside University Dictionary (1984) at 998. Claim 33 does not set forth any requirement that the PLL control signal do anything other than exemplify or typify a characteristic of the PLL.²³

Rather than limit the range of PLL characteristics, the '675 specification makes clear that the identified PLL characteristics, *i.e.*, the frequency of the reference signal, the PLL bandwidth, and the PLL damping factor, are merely exemplary:

The PLL control signal [specifies] various PLL characteristics, *such as* the frequency of the reference signal, the PLL bandwidth, and the PLL damping factor, *etc.*

* * *

²³ A "characteristic" is defined as "serving to identify or set apart a person or group" or "a distinguishing attribute or element." Webster's II New Riverside University Dictionary (1984) at 248. Thus, a signal (such as a power signal) that is uniform across the entire chip while having a definite impact on the PLL, could not be said to be a characteristic of the PLL since it cannot be used to identify or set the PLL apart from the rest of the chip. *See* Milor, Tr. at 448; CX-1978C at 3.

The current scaler 804 sets the reference scale current 812 based on a PLL control signal 810, where the PLL control signal 810 dictates various PLL characteristics *such as* the frequency of the reference signal 210, the PLL loop bandwidth, and PLL loop damping, *etc.*

JX-4 at 3:3-6 and 11:63-67, respectively (emphasis added). Moreover, dependent claim 34 covers a gain compensation circuit where one of the PLL characteristics must include the frequency of the reference signal, the PLL bandwidth or the PLL damping factor. Under the doctrine of claim differentiation, it is generally improper to limit an independent claim by incorporating the limitations of a dependent claim without cause. *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233, 57 USPQ2d 1679, 1685 (Fed.Cir.2001) ("Under the doctrine of claim differentiation, 'each claim in a patent is presumptively different in scope.'") Thus, claim 33 merely requires a PLL control signal that is representative of some PLL characteristic.

6. Fourth Disputed Claim Term (Claim 33: "current mirror")

a. Definition of Claim Term

This phrase appears in claim 33 within the context of "a current mirror including one or more weighted current sources that generate a reference scale current responsive to a PLL control signal." All parties appear to agree that "current mirror" is well-understood in the field of analog design to refer to circuitry that replicates an input current or outputs a current proportional to that input current. BCAB at 64; QCAB at 22-23; CX-1662C at 14, 21; RX-839C at 15; Gutierrez, Tr. at 1392.

b. Support for Interpretation

This interpretation reflects the understanding of one of ordinary skill in the art upon reading the claim. Furthermore, it is consistent with the definition of "current mirror" from a contemporary electronics dictionary. SX-1 at 165.

7. Fifth Disputed Claim Term (Claim 33: "reference scale current responsive to a PLL control signal")

a. Definition of Claim Term

The parties appear to agree that this phrase means a current scaled in response to a PLL control signal. CX-1662C at 20; RX-839C at 13; Gomez, Tr. at 935.

b. Support for Interpretation

This construction is consistent with the description of an embodiment in the specification:

The current scaler 804 sets the reference scale current 812 based on a PLL control signal 810.

JX-4 at 11:63-64. Further, the '675 abstract is consistent in describing "the reference scale current [that] is generated based on a PLL control."

C. The '983 Patent

1. The Inventions Disclosed in the '983 Patent

The '983 patent relates to portable data collection and processing terminals, or mobile computing devices ("MCDs"), that can be used in real-time over one or more radio frequency (RF) networks. JX-5 at 3:35-41. The prior art MCDs on RF networks were equipped with circuitry having built-in radio transceivers that were capable of receiving and transmitting a specific communicative energy like RF, infra-red (IR), wireless LAN, or a wide area network (WAN).

Each transceiver, having unique communicative characteristics, was chosen based on the projected application of a portable data collection terminal; for example, a digital cellular radio might be chosen in an application environment having great distances between the radio and the destination transceiver. JX-5 at 4:1-15. However, the problem with this approach was that each MCD was so specialized that it was only attractive to a particular business environment. JX-5 at 4:1-15; CX-1664C at 10. Wireless technology had been designed and developed by many different companies for a variety of networks using a variety of protocols that it was impossible for a single device to work on such a variety of networks. CX-1339C at 6.

One advance of the '983 patent was taking a modular approach to MCDs. CX-1339C at 5. According to the '983 patent, an MCD design would be largely uniform except for the choice of radio cards or transceivers. CX-1339C at 5. Communication circuitry in the transceivers would convert information received through the transceiver into a predetermined format before being transferred to the single uniform internal processing circuitry and likewise would convert information received from the internal processing circuitry into a format for transmission. JX-5 at 5:22-35; CX-1339C at 5-6. Hence, devices according to the '983 patent would only differ substantially by reason of what transceiver modules were contained in that MCD. CX-1339C at 5-6. The '983 patent also contemplates using an MCD with multiple transceivers to allow communication on two different wireless technologies on two different subnetworks. JX-5 at 5:58-60; CX-1339C at 7; CX-1664C at 10.

The '983 patent also speaks to the problem that establishing and maintaining radio connectivity with a network "places a substantial load on battery power." JX-5 at 5:8-19; CX-

1339C at 7; CX-1664C at 13. The '983 patent identifies the desirable goal of implementing "communication protocol techniques which address power saving and mobility concerns while providing virtually real-time access to the communication link." JX-5 at 5:15-19. To meet this goal, the '983 patent identifies battery-powered mobile computing devices that are capable of operating in a reduced power mode by controlling how often scanning for access points occurs. CX-1339C at 8; CX-1664C at 14.

The person of ordinary skill in the art pertaining to the '983 patent would have a Bachelor's degree in electrical engineering with a few years experience in wireless telecommunications. CX-1664C at 7. Qualcomm suggests that the person of ordinary skill in the art would have a Bachelor's degree in electrical engineering with 5-7 years work experience "directly related to the design, implementation and programming of radio communication devices in the telecommunications industry," a Master's degree in electrical engineering with a specialty in communications and 2 years work experience "directly related to radio communications in the telecommunications industry," or a doctoral degree in electrical engineering with a specialty in telecommunications. RX-838C at 52. Other than Dr. Proakis's impressions from working with people in the telecommunications area, Qualcomm has provided no justification for proposing such a high level of skill in the art. Proakis, Tr. at 2199-201.

2. The File History of the '983 Patent

The application leading to the '983 patent was filed on August 11, 1995, as a continuation-in-part of the application which issued as U.S. Patent No. 5,680,633. JX-10; CX-1713. It is undisputed that the '983 patent has priority from August 31, 1993.

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The original application had claims directed to a "portable data collection terminal" and to a "communication module for use with a portable data collection terminal." JX-10 at BCMITC0000071760-71768. After filing a terminal disclaimer overcoming obviousness-type double patenting over the parent application and adding additional claims directed to communication modules, the applicants in July 2002 withdrew the case from issue to allow the Patent Office to specifically consider the patentability of the claims over the now-issued '633 parent patent. JX-10 at BCMITC0000071964, BCMITC0000072020-72022, and BCMITC0000072053.

On May 28, 2003, the applicants added new claims directed toward "one or more circuits adapted for use in a mobile computing device." JX-10 at BCMITC0000072171-72201. In response, the Patent Office issued a restriction requirement stating that the "portable data collection terminal" claims were patentably distinct from the "one or more circuits" claims. JX-10 at BCMITC0000072204. The applicants elected to proceed with the circuit claims, which were allowed on November 16, 2003 and issued on March 30, 2004 as, *inter alia*, '983 patent claims 1, 4, 8, 9, 11, 14, and 17-24 at issue in this investigation. JX-10 at BCMITC0000072209; JX-5.

As issued, independent claim 1 reads:

One or more circuits adapted for use in a mobile computing device comprising:

a terminal adapted to receive battery power for at least one of the circuits;

communication circuitry comprising a reduced power mode and being adapted to use a first wireless communication and a second wireless communication different from the first wireless communication to transmit data to access points, the

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communication circuitry reducing power by controlling the frequency of scanning for the access points; and

processing circuitry arranged to process data received from the communication circuitry.

JX-5 at 42:56 - 43:2. Independent claim 14, as issued, reads:

A method for use in a mobile computing device to communicate with access points comprising:

receiving battery power;

using the battery power to transmit data to the access points and receive data from the access points using a first wireless communication and a second wireless communication different from the first wireless communication;

reducing the received battery power by controlling the frequency of scanning from the access points; and

processing data received from the first wireless communication and the second wireless communication.

JX-5 at 43:43-44:10.

3. First Disputed Claim Term (Claim 1: “a terminal adapted to receive battery power for at least one of the circuits”)

- a. Definition of Claim Term

Broadcom asserts that this phrase means a lead or connector adapted to receive battery power for at least one of the circuits adapted for use in a mobile computing device. CX-1664C at 15-22. Qualcomm argues that this phrase means "a terminal node or device in a communication network that communicates with other devices in the communication network." RX-838C at 52.

The evidence shows that the person of ordinary skill in the art would understand that, within the context of this circuitry claim, this phrase refers to a lead or connector.

b. Support for Interpretation

In the context of computer technology, the ordinary meaning of "terminal" is "an input/output device having a keyboard for communicating with a computer, and often a display and/or a printer." SX-2 at 2187. This ordinary meaning is consistent with Qualcomm's proposed construction and is broadly consistent with the description of a portable data collection terminal in the specification of the '983 patent. *See e.g.*, JX-5 at title, 3:35-37, 5:11-13; 9:49-51, 12:59-65. On the other hand, in the context of electricity and circuits, a "terminal" is "a point of connection, such as a screw, lug, or other point, for two or more conductors in an electrical circuit." SX-2 at 2187; *see also* CX-1363. This ordinary meaning is consistent with Broadcom's proposed construction and is consistent with the specification's use of "terminal" to refer to the input/output pins of the microprocessor of Figure 3. JX-5 at 6:26-27 ("data bus terminals"), 15:20-21 ("signal terminals"), 15:24-25 ("signal and data terminals"). Nonetheless, the specification does not resolve the issue inasmuch as its usage of the word "terminal" can support either Broadcom's or Qualcomm's proposed construction.

The person of ordinary skill in the art reading claim 1 of the '983 patent, however, would note that the claim is directed toward circuitry. Indeed, the Patent Office stated that the original claims at issue directed toward a "portable data collection terminal" were separate and distinct from those directed toward "one or more circuits for use in a mobile computing device" and issued a restriction requirement, requiring the applicants to choose between the claims for data

terminals and claims for circuitry. JX-10 at BCMITC0000072202-06. Qualcomm's proposed construction ignores this distinction and essentially reads claim 1 as a claim directed toward a portable data terminal, or alternatively would lead one to the improbable conclusion that claim 1 is directed to circuitry that comprises an entire mobile computing device. The person of ordinary skill in the art, understanding that the claim is directed to one or more circuits, would reject Qualcomm's proposed construction and would reasonably conclude that "terminal" refers to a lead or connector, such as for receiving power from a battery.

4. Second Disputed Claim Term (Claim 1: "communication circuitry comprising a reduced power mode")
 - a. Definition of Claim Term

This phrase appears in claim 1 of the '983 patent as part of the element:

. . . communication circuitry comprising a reduced power mode and being adapted to use a first wireless communication and a second wireless communication different from the first wireless communication to transmit data to access points, the communication circuitry reducing power by controlling the frequency of scanning for the access points; and

JX-5 at 42:61-68. According to Broadcom, "communication circuitry comprising a reduced power mode" refers to circuitry that has the ability to conserve power even when it is not performing scanning for access points. CX-1664C at 23. Broadcom argues that the "reduced power mode" of claim 1 is separate and distinct from claim 1's express directive that the communication circuitry reduces "power by controlling the frequency of scanning for access points." CX-1664C at 23. Qualcomm asserts that claim 1 of the '938 patent has no requirement for "operating at reduced power" other than controlling the frequency of scanning for access points. Proakis, Tr. at 2228-29.

In the Staff's view, the person of ordinary skill in the art at the time of the invention would interpret this portion of claim 1 to require communication circuitry that can reduce power by controlling the frequency of scanning for access points and thereby operate in a reduced power mode.

b. Support for Interpretation

The claim element itself, as a whole, supports the Staff's interpretation of the claim phrase. Contrary to Broadcom's argument, the claim does not separately describe two techniques for saving power. CX-1664C at 24. The "controlling the frequency of scanning" phrase refers back to the same communication circuitry that comprises a reduced power mode. Indeed, reducing the frequency of scanning for access points allows the communication circuitry to reduce the power draw from the battery. Proakis, Tr. at 2201-02. Broadcom reads this element of claim 1 as if it were drafted as:

communication circuitry comprising a reduced power mode and being adapted to use a first wireless communication and a second wireless communication different from the first wireless communication to transmit data to access points, the communication circuitry further reducing power by controlling the frequency of scanning for the access points; and

The claim is not so worded. Broadcom's expert, Dr. Nettleton also asserts that the claim uses different language to describe the "mode" and the "scanning" technique and therefore must be describing two different things. CX-1664C at 24. This position is unsupported. Claim 1 of the '983 patent uses the words "reduced power" to describe the "mode" and the words "reducing power" to describe the "scanning" technique. In the Staff's view, this difference in the verb tense

of "reduce" is not sufficient to indicate that the "reduced power" mode must be something other than the technique described within the claim itself for "reducing power."

The specification never uses the term "reduced power mode" but only refers to a sleep mode in which the radio is powered down except when it is scanning for access points or actually communicating with the host computer. JX-5 at 30:3-7. The cited passage makes clear that the "sleep mode" is simply the time interval between each access point scan. Thus, the communication circuitry enters into "sleep" or a "reduced power mode" by controlling the frequency of scanning for access points. If the communication circuitry continuously scans for access points, it never enters into the "sleep" or "reduced power mode." It is only when the communication circuitry controls the frequency of scanning for access points that the circuitry is allowed to "sleep" or enter the "reduced power mode." Accordingly, the specification supports the construction put forth by Qualcomm and the Staff.

Broadcom also points to one embodiment in the specification as supporting its interpretation that "reduced power mode" is separate from controlling the frequency of scanning for access points. CX-1664C at 24. Specifically, Broadcom refers to the '983 patent at column 18, lines 16-64 in which the "normal state" of certain processors are described as operating at a "power saving 'slow' clocking speed" in a "sub-active or dormant state." *Id.* Generally, limitations from the specification should not be incorporated into the claims unless absolutely necessary. *Phillips*, 415 F.3d at 1323. Broadcom does not provide any rationale as to (i) why these processors are communications circuitry within the meaning of claim 1, (ii) why one of ordinary skill would

equate the "normal state" of these processors with the "reduced power mode" of the claim, or (iii) why it is necessary to import limitations from the specification into claim 1 of the '983 patent.

5. Third Disputed Claim Term (Claim 1: "communication circuitry...being adapted to use a first wireless communication and a second wireless communication different from the first wireless communication to transmit data to access points")

- a. Definition of Claim Term

Broadcom asserts that this phrase means communication circuitry adapted to use two different air interfaces (or wireless protocols) for transmitting digital information to access points. CX-1664C at 25. Qualcomm asserts that "wireless communication" refers to "the exchange of information by signals transmitted through a medium that is not a wire" and "data" means any communicative information, including information transmitted by analog or digital means." QCAB at 29.²⁴ The Staff submits that the plain meaning of this phrase to one of ordinary skill in the art is communication circuitry suitable for transmitting analog or digital data (but not control signals) to access points using two different methods of communication.

- b. Support for Interpretation

The Staff's construction relies upon a plain reading of the claim phrase. At the time of the invention, the plain meaning of "communication" in the telecommunications field was "any method or means of conveying information from one person or place to another, especially over

²⁴ Qualcomm's expert, Dr. Proakis, was precluded from testifying as to the meaning of "data" inasmuch as such construction was outside the scope of his three expert reports. Tr. at 1862; *see generally* Tr. at 1856-62.

wires or radio waves and excluding only correspondence through postal agencies, or direct and unassisted conversation." SX-2 at 477.

Qualcomm's construction is overly broad inasmuch as it allows for two different frequency emissions from the same radio using the same technology on the same subnetwork to constitute the claimed two different radio communications. While Qualcomm asserts that the specification supports such a construction, the portions of the specification cited do not envision two different frequencies within the same network, using the same technology. JX-5 at 4:52-56 states:

Communications supported by computer modules may include wired connection, such as over phone lines for a modem or through a wired local area network (LAN) and wireless communication such as a wireless LAN, a wide area network (WAN) or infrared.

Wireless LAN, wireless WAN, and infrared signals may be different frequencies, but they are also different methods of communicating. Likewise, the patent, JX-5 at 5:27-30, refers to "any type of communicative energy, including but not limited to wired and wireless communication such as radio frequency, wired network communication, and infrared." Again, radio, wired network and infrared are clearly different methods of communicating. The specification refers to "wireless links" as the communicative coupling between access points and the mobile computing device. JX-5 at 39:66-40:2. In turn, these wireless links refer to methods or technologies for wireless communication:

The wireless links 1455 may be one or more of a plurality of wireless communications technologies including narrow band radio frequency, spread spectrum radio frequency, infrared, and others.

JX-5 at 40:2-6. Finally, in describing one embodiment of a mobile computing device, the specification states:

MCDs 1606 are also part of a wireless network with wireless server 1602, and are communicatively coupled to each other and the wireless server 1602 via wireless communication links 1608. Wireless links 1608 may be radio frequency communication links, such as narrowband, direct sequence spread spectrum, frequency hopping spread spectrum or other radio technologies. Alternatively, wireless links 1608 may be infrared communication links, or other wireless technologies.

JX-5 at 42:10-18. Again, "wireless links" are referred to as different radio, infrared, or other technologies. These passages support the Staff's interpretation of this portion of claim 1, "communication circuitry . . . adapted to use a first wireless communication and a second wireless communication different from the first wireless communication," as requiring communication circuitry capable of using two different wireless technologies or wireless links to transmit data to access points.

Broadcom's construction reads limitations into the claim including a requirement that all data to be transmitted must be digital. CX-1664C at 28. Broadcom's only support for this limitation consists of two sections from the specification describing digital communication between the microprocessor of the processing circuitry and the communications circuitry. BCAB at 95-96, *citing* JX-5 at 9:63-65, 19:66-20:1. The mechanics of the internal data processing has no relationship whatsoever with the claim phrase "communication circuitry . . . to transmit data to access points." However, in describing Figure 1A, the specification does distinguish between data

and control signals.²⁵ JX-5 at 9:63-65. Control signals refer to machine-to-machine communications. Netteleton, Tr. at 617. A person of ordinary skill in the art at the time of the invention would recognize a distinction between user payload data and control signals. *Id.* at 617-18. Indeed, the specification's repeated use of the phrases "data collection" and "data collection terminals" would indicate to one of ordinary skill in the art that "data" was referring to payload data, for example inventory bar codes, and not control signals since there is no reason why one would want to collect control signals. *Id.*; *see also* JX-5 at 10:21-24; 23:62-65. Therefore, the specification supports a construction for "data" that excludes control signals but is not limited to digital format.

6. Fourth Disputed Claim Term (Claim 1 and 14: "the communication circuitry reducing power by controlling the frequency of scanning for access points")

- a. Definition of Claim Term

This phrase appears in claims 1 and 14 of the '983 patent. Broadcom asserts that this phrase means that the "communication circuitry is adapted to vary how often it looks for an access point when attempting to open a communication channel with the network." CX-1664C at 29; CX-1979C at 5-7; CX-1339C at 8 ("scanning for access points" as looking for an opportunity to communicate with the system). Qualcomm argues that this phrase means "to examine received

²⁵ The specification also repeatedly refers to the "data and communication module 200." *See, e.g.*, JX-5 at 6:17, 9:53-54, 10:8, 10:44, 11:25, 12:8-9. Accordingly to the patent, "communication within the network is generally governed by software control" that defines an overall communication protocol. JX-5 at 11:7-13. This selection is consistent with an understanding that the data and communication module handles both "data" (user payload) and "communication" (control protocol).

signals to determine which access points are within radio coverage of the mobile." QCAB at 30. The Staff submits that this phrase means communication circuitry that is adapted to vary how often it looks for an access point for any reason whatsoever.

b. Support for Interpretation

The phrase "scanning for access points" is not used in the '983 specification. However, the '983 patent states "in a preferred embodiment, mobile computer devices remain in a sleep mode, where their radio is powered down, except when they are actually communicating with the host computer 510 *or* when they periodically awaken to synchronize with an access point." JX-5 at 30:3-7 (emphasis added). Further, "in another embodiment, the MCD 518 is capable of roaming between access point coverage areas and may disconnect the RF link with the access point 512 in favor of connection with a different access point 514." JX-5 at 30:10-13. Accordingly, the patent appears to contemplate that the mobile computing device will need to look for an access point (i) when it wishes to communicate with the host computer and (ii) when it periodically awakens and looks for a favorable access point with which to synchronize. There is nothing in claim 1 to restrict "scanning for access points" to any particular situation. Indeed, a plain reading of the claim as informed by the description of the invention in the specification supports the Staff's proposed construction that this element requires the device to control the frequency with which it scans for access points for any reason.

Specifically, Figures 12-16 describe a mobile computing device waking up, listening to synchronize with an access point, sensing the communication channel to see if it is free so that the mobile computing device can transmit data, and if the communication channel is busy, the mobile

computing device returns to the sleep mode for a period before attempting to transmit data to the access point again. Nettleton, Tr. at 2539-41; CX-1979C at 5-7; CX-1339C at 8. In the circumstances where a channel remains busy, the mobile computing device may conserve power by prolonging the time it sleeps and thereby decreasing the frequency of looking for an access point. CX-1339C at 8; JX-5 at 30:65-31:8, 31:40-46, 32:5-9.

- 7 Fifth Disputed Claim Term (Claim 11: “processing circuitry enables switching from the reduced power mode to an increased power mode of the processing circuitry...”)

- a. Definition of Claim Term

Broadcom asserts that this claim element means that the processing circuitry must be able to determine when to switch itself from a reduced power mode (where data is processed at a slower clock rate) to an increased power mode (where data is processed at a faster clock rate). CX-1664C at 29. Qualcomm asserts that this claim element means that the processing circuitry is capable of switching from a reduced power mode to an increased power mode. QCAB at 33. The plain reading of the claim requires only that the processing circuitry makes it possible to switch from a reduced power mode to an increased power mode.

b. Support for Interpretation

The plain meaning of "enable" is to make possible.²⁶ Neither the specification nor the prosecution history define "enable" in any other way. Hence, the term "enable" should be given its ordinary meaning within this claim element.

Broadcom's attempt to complicate the processing circuitry should be rejected. The claim itself does not refer to clocks or clocking rates. Broadcom's expert relies upon one embodiment in the specification in which the microprocessor circuit "can include" a clock control circuit to support his interpretation that the claim should be limited to a reduced power mode and increased power mode in which data is processed at slower and higher clock frequencies, respectively. CX-1664C at 29-30. However, Broadcom has not presented any reason why this claim that does not mention clocks, clock frequencies, or data processing rates, should be limited to one specific embodiment described in the specification. Incorporating limitations from the specification into a claim is highly disfavored. *Phillips*, 415 F.3d at 1323. Hence, this claim element should be interpreted simply as one or more circuits of claim 1 in which the processing circuitry makes it possible to switch from a reduced power mode to an increased power mode.

²⁶ "Enable" is defined as:

1.a. To supply with the means, knowledge, or chance to be or do something. b. To make possible. 2. To give legal power, capacity or sanction to.

Websters II New Riverside University Dictionary (1984) at 429.

8. Sixth Disputed Claim Term (Claim 24: “reducing the frequency of the processing . . . increasing the frequency of the processing”)

a. Definition of Claim Term

This phrase appears in claim 24 of the '893 patent within the context of the following claim element:

wherein the reducing the received battery power comprises reducing the frequency of the processing and wherein the increasing the received battery power comprises increasing the frequency of the processing.

JX-5 at 44:36-40. Broadcom contends that this phrase requires "processing circuitry that is able to determine when to switch itself from a reduced power mode (where data is processed at a slower clock rate) to an increased power mode (where data is processed at a faster clock rate) based upon the need to transmit or receive data." CX-1664C at 30. Qualcomm asserts that this phrase requires reducing the number of occurrences of computerized data manipulation (including separation of control signals from other signals and performing functions called for by control signals) in a period of time and likewise increasing the number of occurrences of computerized data manipulation in a period of time. QCAB at 33. The Staff submits that the plain meaning of this phrase is to decrease the energy drawn from the battery by decreasing how often the payload data received from the wireless communications circuitry is processed. Similarly, energy consumption may be increased by increasing how often the payload data received from the wireless communications circuitry is processed.

b. Support for Interpretation

The wording of the phrase "reducing the received battery power comprises reducing the frequency of the processing" is very similar to that describing the communications circuitry of claim 1: "the communications circuitry reducing power by controlling the frequency of scanning for the access points." JX-5 at 42:65-67; 44:36-40. For the reasons stated above, this phrase should be construed similarly, *i.e.*, reducing how often data received from the first and second wireless communications is processed. Such a reading is consistent with what a person of ordinary skill in the art at the time of the invention would understand. Proakis, Tr. at 2205.

Broadcom's construction adds a clock limitation that is not expressly required by the claim. Proakis, Tr. at 2205. Further, as Dr. Proakis explained in his testimony, incorporating such a clock limitation is not necessary to implement the claim as written. *Id.* at 2205-07; SDX-1. Where the language of a claim does not require a limitation, it is improper to incorporate a limitation from the specification into the claim. *Phillips*, 415 F.3d at 1323.

D. The '311 Patent

1. The Inventions Disclosed in the '311 Patent

The '311 Patent addresses problems associated with communicating between host computers and RF terminal nodes in radio data communications systems. RX-838C at 3. In early RF data communication systems, RF terminal nodes sent data to a base system that was directly connected through an Ethernet line to a host computer. JX-3 at 1:33-36. Thus, data was sent from the RF terminal node to the host computer in a "single-hop." *Id.* at 1:36-43. Later RF data communications organized based stations into layers so that data would be sent through

intermediate stations along a "multiple-hop" route between an RF terminal node and the host computer. *Id.* at 1:47-48. Problems arose in maintaining the integrity of multiple-hop systems when the system had to accommodate both wireless and hard-wired station connections, and in connection with efficient dynamic routing of data, mobility of the RF terminal nodes, and interference from many different sources. *Id.* at 62-66.

The '311 patent discloses an RF Local-Area Network (LAN) wherein messages are passed to and from the host computer and the RF terminal node through gateways and bridges linked to base stations by host ports. RX-838C at 3. Bridges are intermediate nodes that repeat data messages to and from gateways, RF terminal nodes, and other bridges, ultimately extending the range of the gateways. *Id.* As a conceptual aid, an optimal configuration of terminals, gateways, bridges, and host computers designed to control the flow of communications is called a "spanning tree." JX-3 at 2:26-29. The roots of the tree are the gateways; the branches are the bridges; and non-bridging stations, such as RF terminal nodes, are the leaves of the tree. *Id.* at 2:31-32. Data packets are sent along the branches; and nodes in the network use a backward learning technique to route data packets along the correct branches. *Id.* at 2:33-35.

The '311 patent further teaches efficient, dynamic data routing that is transparent to the RF terminals and which ultimately is unaffected by the means used by the RF network to deliver the data. Indeed, one primary object of the invention of the '311 patent was for the RF network to be capable of handling mobile RF terminal nodes and lost intermediate nodes with minimal impact on the system as a whole.

To illustrate such a network, the '311 specification describes a communication protocol involving transmission of “HELLO” packets. RX-838C at 4. HELLO packets are beacons that are periodically broadcast by gateway and bridging nodes attached to the network. JX-3 at 3:49-54; RX-838C at 4. A node that is not attached to the network relies on HELLO beacons to select a nearby node to which it can efficiently attach. RX-838C at 4. After a terminal node synchronizes on a HELLO message with a parent node, the terminal node can power down, entering a sleep state, with an active timer interrupt calibrated using the synchronized seed value to wake it just before the next expected HELLO message. RX-838C at 4-5.

Moreover, by adding a “pending message” list to the HELLO beacon, the invention provides that an RF terminal node is notified that a message awaits delivery. The base station stores messages awaiting delivery to sleeping terminal nodes and then transmits them after the HELLO message. RX-838C at 4. The terminal node stays in a low power state in between HELLO beacons even when one or more beacons is missed. Thus, pending messages are stored when pending messages cannot be delivered such as when intermediary nodes are compromised or the terminal node falls out of range. The integrity of network is thereby maintained and power consumption by the terminal nodes is minimal.

The person of ordinary skill in the art pertaining to the '311 patent would have a Bachelor's degree in electrical engineering with a few years experience in wireless telecommunications. CX-1664C at 7. As with the '983 patent, Qualcomm argues for a higher level of ordinary skill in the art but provides no convincing support for that position other than Dr. Proakis's generalized impressions. Proakis, Tr. at 2199-201; RX-838C at 52.

2. The File History of the '311 Patent

The claims at issue in this investigation are claims 1-5, 7, 8, 13-14, and 16-19 of the '311 patent, of which claims 1 and 16 are independent claims. RX-838C at 6. The claims at issue were not part of the original disclosure but were added by Preliminary Amendment on April 14, 1998 as application claims 15-19, 21, 22, 27-28, and 30-33. JX-8 at BCMITC0000071493-71502. Also in the Preliminary Amendment, the patent applicants cancelled the "Cross-Reference to Related Applications" section and substituted a section claiming priority to U.S. Patent No. 5,740,366 ("the '366 patent") and its predecessor applications and a PCT application. JX-8 at BCMITC0000071493-71494. The Patent Examiner rejected claims 15-34 as obvious over the '366 patent. JX-8 at BCMITC0000071518. In response, the patent applicants filed a terminal disclaimer to overcome the obviousness-type double patenting rejection over the '366 patent. JX-8 at BCMITC0000071529, BCMITC0000071532-71533. The patent examiner allowed claims 15-33 without substantive comment on February 9, 2000. JX-8 at BCMITC0000071536-71538. After allowance, a certificate of correction issued to correct the "Cross-Reference to Related Applications" section of the issued patent. JX-8 at BCMITC0000071604.²⁷

As issued, claim 1 reads:

A communication network supporting wireless communication of messages, said communication network comprising:

a first terminal node having a wireless receiver operable in a normal state;

²⁷ Notwithstanding the confusing file history with respect to priority, it is the Staff's understanding that for purposes of this investigation all parties agree that the earliest priority date of the '311 patent corresponds to that of the '366 patent, October 1, 1991. Nettleton, Tr. at 626.

a second terminal node having a wireless receiver operable in a power saving state;

an access point that attempts to immediately delivery messages destined for the first terminal node;

the access point attempts to deliver messages destined for the second terminal node by transmitting at predetermined intervals beacons that identify that a message awaits delivery;

the second terminal node synchronizes operation of its wireless receiver to receive the beacons from the access point; and

the second terminal node determines from the received beacons that it has a message awaiting delivery and direct further operation of its wireless receiver to receive the message.

JX-3 at 19:56-20:9. Independent claim 16 reads:

A communication network supporting wireless communication of messages, said communication network comprising:

a first terminal node operating in a first state;

a second terminal node operating in a second state in which attempts are made to minimize power consumption by the wireless receiver;

a bridging node having a wireless transceiver to support wireless communication to the first and second terminal nodes;

the bridging node attempts to deliver messages destined for the second terminal node by transmitting at predetermined intervals beacons that identify a message awaiting delivery;

the second terminal node synchronizing operation of its wireless receiver to receive the beacons from the bridging node and determining from the received beacons that it has a message awaiting delivery and responding to an awaiting message by directing further operation of its wireless receiver to receive the message; and

the bridging node delivering messages to the first terminal node without requiring the first terminal node to determine from the beacons that it has messages awaiting delivery.

JX-3 at 20:65-21:22.

3. First Disputed Claim Term (Claim 1: “a first terminal node having a wireless receiver operable in a normal state”/“a second terminal node having a wireless receiver operable in a power saving state”)

- a. Definition of Claim Term

Broadcom asserts that "normal state" means that the wireless receiver is powered on while the "power saving state" means that the wireless is powered off. CX-1664C at 75. Qualcomm asserts that the "normal state" is one in which the terminal continuously monitors transmissions from the access point while the "power saving state" is one in which the terminal regularly cycles through periods where it does not monitor and periods where it actively monitors transmissions from the access point. RX-838C at 4-5, 6; QCAB at 37. The Staff submits that these claim elements require a first terminal node in which the wireless receiver is capable of receiving messages at full power and a second terminal node in which the wireless receiver is powered down but capable of receiving messages at periodic intervals.

- b. Support for Interpretation

The '311 patent specification does not use the terms "normal state" and "power saving state" and never describes the power state of a wireless receiver itself. Rather, the '311 patent specification describes a sleeping terminal node as distinguished from a non-sleeping terminal node. *See* RX-838C at 4-5. Qualcomm's proposed construction is an accurate description of the normal state of the terminal node and the power saving state of the terminal node. However, claim

1 does not refer to the state of the terminal node but rather refers to the wireless receiver being in a normal or power saving state. The Staff agrees with Qualcomm that two terminals are required - - one terminal having a fully powered receiver capable of receiving messages and another terminal with a receiver operating in a power-saving state so that it is only periodically capable of receiving messages. However, the Staff does not agree that the claim requires two fixed types or categories of terminals - - one that continuously operates its receiver in a fully powered state and one that continuously operates its receiver in a power-saving state. *See* RX-838C at 6. Rather, in the Staff's view, the claim only requires that at a given time there are at least two terminals -- one with its receiver powered up and one with its receiver in the power-saving state.

Broadcom's construction ignores the word "operable" in the claim phrase. Under Broadcom's construction, the receiver would have to be operable when powered off.²⁸ Neither the '311 patent nor Broadcom provides a description of a receiver that is operable without power. Indeed, a receiver cannot operate or receive messages without power. Proakis, Tr. at 2198-99. In an attempt to support its interpretation, Broadcom cites to the '311 specification that states:

A SLEEPING terminal can power-down with an active timer interrupt to wake it just before the next expected hello message.

CX-1664C at 75, *citing*, JX-3 at 15:46-47. Broadcom's expert then broadly concludes that this passage "confirms" Broadcom's proposed construction. CX-1664C at 75. This passage is equally consistent with the constructions offered by Qualcomm and the Staff.

²⁸ Moreover, Broadcom apparently restricts the "power saving state" of the receiver to one in which *all* power is "turned off." CX-1664C at 75. Broadcom has not shown any support for adding such a limitation to the claim.

4. Second Disputed Claim Term (Claim 1: “an access point that attempts to immediately deliver messages destined for the first terminal node”)
 - a. Definition of Claim Term

Broadcom argues that this phrase means that "the access point attempts to deliver messages for the first terminal node at the first opportunity consistent with network protocols." CX-1664C at 76. Qualcomm asserts that this phrase means that the access point must "deliver the message with no delays except for those delays inherent in wireless communication."²⁹ RX-838C at 8.

²⁹ In its prehearing brief, Qualcomm asserted that this construction is binding on Broadcom as a result of the "Markman" decision in the *Broadcom v. Agere Systems, Inc.* litigation in the U.S. District Court for the Eastern District of Pennsylvania. QCAB at 38. The Staff does not agree. It is the Staff's understanding that after this decision, the case was settled and there was never an appealable final judgment. While some district courts have applied collateral estoppel under these circumstances, other district courts have followed the pre-*Markman* Federal Circuit rule that a claim interpretation must be essential to a final judgment in order for there to be collateral estoppel and thus have a preclusive effect.

- Cases applying collateral estoppel: *TM Patents, L.P. v. IBM Corp.* 72 F. Supp. 2d 370, 376-77, 379 (S.D.N.Y. 1999); *Abbott Labs v. Dey L.P.*, 110 F. Supp. 2d 667, 671-72 (N.D. Ill. 2000); *Edberg v. CPI-The Alternative Supplier, Inc.*, 156 Supp. 2d 190, 195-96 (D. Conn. 2001).
- Cases not applying collateral estoppel: *Pfaff v. Wells Elecs., Inc.*, 5 F.3d 514, 518 (Fed. Cir. 1993); *see also*, *Graco Children's Products, Inc. v. Regalo Int'l, LLC*, 77 F.Supp.2d 660, 644 (E.D. Pa. 1999); *Kollmorgen Corp. v. Yaskawa Elec. Corp.*, 147 F.Supp.2d 464, 469-70 (W.D. Va. 2001).

In *Certain EPROM, EEPROM, Flash Memory, and Flash Microcontroller Semiconductor Devices, and Products Containing Same*, Inv. No. 337-TA-395, 2001 WL 242553 at *72 (2001), the Commission required a final judgment. The Federal Circuit, in its first post-*Markman* case on collateral estoppel and prior claim construction, followed its pre-*Markman* rule that collateral estoppel cannot apply to claim construction where the prior claim interpretation is not essential to a judgment. *RF Delaware, Inc. v. Pacific Keystone Technologies, Inc.*, 326 F.3d 1255, 1261 (Fed. Cir. 2003).

According to Qualcomm, "immediate" delivery distinguishes messages bound for "normal" mode terminals, which are transmitted as soon as the channel is available, from those bound for "power-saving" mode terminals, which must be stored until a pre-determined time in the future when a beacon is transmitted. *Id.* Broadcom substantially agrees, stating that the claim makes a distinction "between terminals whose receivers are presently powered up, where an access point can make its attempt to deliver a message right now, and terminals whose receivers are only intermittently powered (in a power saving state), where an access point must wait until the power to the wireless receiver ramps up before attempting delivery." CX-1664C at 76. Thus, all parties agree that this claim element requires the access point to attempt to deliver messages to a terminal node with a non-sleeping receiver at the first opportunity.

The dispute between the private parties seems to center around whether "an immediate attempt to deliver a message" can include storage of messages for delivery in anything other than first-in first-out queue. RX-838C at 9; CX-1979C at 40-41.

b. Support for Interpretation

The agreed-upon interpretation is supported by the plain meaning of the claim and the description of the network in the specification:

When a packet arrives at a node from the host computer directed to an RF terminal, the node checks its routing entry table and forwards the data packet to its child node which is along the branch destined for the RF terminal. . . . The forwarding of the data packet continues until the data packet reaches the final node on the branch, which then forwards the data packet directly to the terminal itself.

JX-3 at 7:29-38. Hence, the specification contemplates delivery of messages at the first opportunity according to a routine protocol for forwarding data packets to terminal nodes. *See also* JX-8 at BCMITC0000071403. Likewise,

A node initially synchronizes on a hello message from its parent. A SLEEPING node can power-down with an active timer interrupt to wake it just before the next expected hello message. The network entity in base station nodes can store messages for SLEEPING nodes and transmit them immediately following the hello messages. This implementation enables SLEEPING terminals to receive unsolicited messages. *(Note that the network layer always tries to deliver messages immediately before storing them)*. Retries for pending messages are transmitted in a round robin order when messages are pending for more than one destination.

JX-3 at 15:44-54 (emphasis added); *see also* JX-3 at 7:29-47, 15:47-54; *compare* 9:49-51, 10:32-36. Contrary to Qualcomm's proposed construction, these portions of the '311 specification do not exclude some type of scheduling function and do not specify a first-in first-out queue. Rather, as Qualcomm's expert agreed at trial, delivery may be immediate even if it is not in a first-in first-out order. For example, when a package is sent through Federal Express, delivery may be immediate even though the package has traveled through the system and may not be the first delivery on the route, as long as it was delivered in accordance with some routine scheduling function.³⁰ Proakis, Tr. at 2110-12.

³⁰ Both experts on this patent agreed that one may "attempt immediate delivery" without achieving actual delivery. Proakis, Tr. at 2112-13; Nettleton, Tr. at 2537.

5. Third Disputed Claim Term (Claim 1: “attempts to deliver messages destined for the second terminal by transmitting at predetermined intervals beacons that identify that a message awaits delivery”)

- a. Definition of Claim Term

All parties appear to agree that the plain meaning of this phrase is that the access point attempts to deliver messages destined for sleeping terminals by transmitting at calculable intervals "beacons" that identify that a message awaits delivery. CX-1664C at 79; RX-838C at 9. The only dispute between the private parties is the meaning of "beacon."³¹ Broadcom proposes that beacon is simply a signal that indicates that there is a message to be delivered. CX-1664C at 79. Qualcomm agrees that such function is a necessary feature of a beacon but argues that such function alone is not sufficient to define a beacon. RX-838C at 9. Rather, according to Qualcomm, a beacon must regularly transmit messages to identify the existence of the base station to terminals within its coverage area. RX-838C at 9, 13. The Staff submits that the language of claim 1 itself defines beacon as a signal that indicates that there is a message to be delivered.

- b. Support for Interpretation

The '311 patent specification does not use the term "beacon." RX-838C at 9. This term appeared in the claims of what became the '311 patent in 1997. RX-838C at 9-10. Beacon is a term of art developed from the WiFi art and specifically disclosed in the IEEE 802.11 WiFi standard. RX-838C at 10. The IEEE 802.11 WiFi standard was approved June 26, 1997. *Id.*

³¹ Qualcomm proposes that "predetermined interval" means a time interval that can be calculated in advance. RX-838C at 9 and 13. The Staff is unaware of any dispute regarding this claim term.

Within the WiFi art in 1997, "beacon" referred to a signal transmitted periodically that contained information (i) sufficient to identify access points that are accessible to each wireless device, and (ii) sufficient to identify a cell, or set of wireless devices that synchronize their operation to a particular access point. *Id.* Relying upon the IEEE standard and a variety of publications, all but one published after the filing date of the '311 patent, Qualcomm urges the adoption of the IEEE definition of "beacon." RX-838C at 10-13. However, as the Federal Circuit recently reiterated, "the ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, *i.e.*, as of the effective filing date of the patent application," not as of the date the claim term was added to the claims.³² *Phillips*, 415 F.3d at 1313.

However, both parties agree that within the embodiment described in the specification of the '311 patent, the HELLO messages are beacons. RX-838C at 13-14; CX-1664C at 80-81. The HELLO messages described in the specification are periodically transmitted and identify that a message is waiting for delivery. JX-3 at 12:11-13; 12:36-39; 15:15-18; 18:66-19:28. It is also clear that the HELLO messages described in the '311 specification perform the function of identifying nodes so that any unattached terminals may identify an access point and request attachment onto the network. *See, e.g.*, JX-3 at 5:34-46. The Staff agrees with Qualcomm that

³² Although Qualcomm cites to a single 1991 paper that defines "beacon," this single piece of extrinsic evidence is not sufficient to establish that the term beacon had acquired a specific meaning to those of ordinary skill in the telecommunications fields in 1991. *See* RX-613a. In this case, this single piece of extrinsic evidence is not sufficient to trump the express definition provided within the claim itself.

such an identification function is required by a HELLO "beacon" in the exemplary network described in the '311 patent specification and may be highly desirable in designing a mobile system. However, claim 1 does not require the precise embodiment disclosed in the '311 patent specification nor does it require the design of an optimal system.³³ Thus, this identifying function should not be read into the claim.

6. Fourth Disputed Claim Term (Claim 1 and 13: "the second terminal node synchronizes operation of its wireless receiver to receive the beacons from the access point")

- a. Definition of Claim Term

Broadcom asserts that this phrase means that "the second terminal node determine[s] for itself when to transition its wireless receiver from the 'power saving state' to the 'normal state' in order to receive beacons from the access point." CX-1664C at 83; BCAB at 115. Qualcomm argues that this phrase means "that the terminal node synchronizes its receiver to receive beacons from the access point by using its receiver to monitor radio communications from the access point at the time that the terminal knows that beacons will be transmitted." QCAB at 41. The Staff submits that this phrase means that a terminal node with a receiver in the power-saving state synchronizes the sleep-wake cycles of its receiver to receive the beacons from the access point.

³³ As Dr. Nettleton explained, this identification and synchronization function could, and in fact in some systems is, performed by a signal other than the beacon that indicates a message waiting. Nettleton, Tr. at 622.

b. Support for Interpretation

The Staff relies upon the plain meaning of the claim phrase and the Staff's construction of second terminal node, discussed above. Broadcom's construction imputes an intelligence to the second terminal node that is not justified. Broadcom's attempt to use claim 13 to support its proposed construction that claim 1 allows the second terminal node to pick and choose beacons that it will listen to is not justified. CX-1664C at 83. Claim 13 reads:

the second terminal node synchronizes operation of its wireless receiver to receive the beacons from the access point even when one or more of the beacons from the access point have not been received

JX-3 at 20:54-58. Claim 13 covers a system that is robust enough to support the network even if a beacon is missed. CX-922C at 3. Claim 13 does not teach a system in which a terminal "decides" to skip beacons. *Id.* There is nothing in the claim or the '311 patent specification to even suggest that the second terminal node can choose not to wake up to listen for an expected beacon. RX-922C at 2-3. The specification describes the receipt of beacons by SLEEPING nodes as follows:

a SLEEPING node can power-down with an active timer interrupt to wake it just before the next expected hello message . . .

JX-3 at 15:45-47. Broadcom's attempts to use this passage to bolster its proposed construction that a terminal can choose to skip hello messages. CX-1664C at 83. However, the plain reading of this passage indicates that the terminal does not decide to skip hello messages but rather sets the timer for the receiver to wake just before "*the next expected hello message.*" This passage is entirely consistent with the Staff's proposed construction that a terminal node having its receiver in

the power-saving state times the sleep-wake cycle of its receiver in order to be awake to receive the beacons from the access point.

7. Fifth Disputed Claim Term (Claim 1, 3, and 17: “the second terminal node . . . directs further operation of its wireless receiver to receive the message”)

- a. Definition of Claim Term

This phrase appears in claim 1 within the context of "the second terminal node determines from the received beacons that it has a message awaiting delivery and directs further operation of its wireless receiver to receive the message." JX-3 at 20:6-9. Broadcom asserts that this phrase means "that upon receiving a beacon indicating that it has a message awaiting delivery, the second terminal node maintains its wireless receiver in the 'normal' state in order to receive the message." CX-1664C at 84. Qualcomm argues that this phrase means "the second terminal node uses its radio receiver to receive a transmitted message." QCAB at 42. The Staff submits that the plain meaning of this phrase is that when the second terminal node has been notified by the beacon that a message awaits, it directs the wireless receiver to interrupt its power-saving sleep-wake cycle (*i.e.*, to stay awake) in order to receive the message that is forthcoming.

- b. Support for Interpretation

The Staff relies upon the plain meaning of the claim.

8. Sixth Disputed Claim Term (Claim 16: “a second state in which attempts are made to minimize power consumption by the wireless receiver”)

- a. Definition of Claim Term

This phrase is found in claim 16 within the context of "a second terminal node operating in a second state in which attempts are made to minimize power consumption by the wireless receiver." JX-3 at 21:2-4. Broadcom argues that this means that "attempts are made to reduce power consumption by the wireless receiver to an extent consistent with desired operation." CX-1664C at 85. Qualcomm argues that this phrase refers to a second state in which "attempts . . . to minimize power consumption" constitute the power-saving state. QCAB at 43. The Staff submits that, similar to claim 1, this phrase means a second terminal node operating with a receiver in a powered-down or power-saving state.

- b. Support for Interpretation

The Staff relies upon the plain meaning of the claim phrase and upon the Staff's construction of the power-saving state in claim 1, discussed above. Claim 1 requires a first terminal node with a receiver operable in a normal state and a second terminal node with a receiver operable in a power saving state. By contrast, claim 16 requires the first terminal node to be operating in a first state and the second terminal node to be operating in a second state defined by attempting to minimize power consumption by the wireless receiver. Since the second state is defined by minimizing power consumption by the wireless receiver and claim 1 defines the power saving state of the wireless receiver, the Staff submits that the second state of claim 16 is the power saving of claim 1. Further, the '311 patent specification describes two states relating to

power consumption of the terminal node - - "SLEEPING" (or "power-saving") and "not SLEEPING" (or "normal"). Contrary to Broadcom's construction, there is no description or suggestion in the specification of a terminal reducing the power used by the receiver in any manner other than by "SLEEPING."

IV. INFRINGEMENT/NONINFRINGEMENT

A. Legal Principles

1. Direct Infringement

Direct infringement consists of making, using, offering to sell, or selling a patented invention without the consent of the patent owner. 35 U.S.C. § 271(a); *see also Hoeschst-Roussel Pharmaceuticals, Inc. v. Lehman*, 109 F.3d 756, 759 (Fed. Cir. 1997). The complainant has the burden of demonstrating infringement. *See, e.g., Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co.*, 204 F.3d 1360, 1364 (Fed. Cir. 2000) ("it is axiomatic that the *patentee* bears the burden of proving infringement") (emphasis in original); *Certain Semiconductor Memory Devices and Products Containing Same*, Inv. No. 337-TA-414, Initial Determination at 70 (March 16, 2000) ("A party alleging infringement has the burden of proving infringement by the preponderance of the evidence.").

Direct literal infringement occurs when the claim reads on the accused device exactly. *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1580 (Fed. Cir. 1989); *see also Pall Corp. v. Micron Separations, Inc.*, 66 F.3d 1211, 1217 (Fed. Cir. 1995) ("Literal infringement is found when every limitation of a claim is met in the accused structure."). An accused device may infringe if it has the existing capability of functioning in the manner described in a patent claim. *Intel Corp.*, 946

F.2d at 832 (a programmable device capable of operating in an infringing mode infringes). However, the capacity to infringe must be inherent in the accused device. *Fantasy Sports Properties, Inc. v. Sportsline.com, Inc.*, 287 F.3d 1108, 1118, 62 USPQ2d 1564 (Fed. Cir. 2002) (device infringed where user had to activate an infringing mode written into the underlying software). An accused device does not infringe merely because it is capable of being modified or altered to operate in an infringing manner. *High Tech Medical Instrumentation, Inc. v. New Image Industries*, 49 F.3d 1551, 1555 (Fed. Cir. 1995). However, if a device is designed to be altered or assembled before operation, the manufacturer may be held liable for infringement if the device, as altered or assembled, infringes a valid patent. *Paper Converting Machine Co. v. Magna-Graphics Corp.*, 745 F.2d 11, 19 (Fed. Cir. 1984).

2. Inducement of Infringement

Section 271 (b) of the Patent Act states: “Whoever actively induces infringement of a patent shall be liable as an infringer.” 35 U.S.C. § 271(b). A finding of induced infringement requires a showing that there has been direct infringement and a showing of intent.

Insituform Techs., Inc. v. Cat Contracting, Inc., 385 F.3d 1360, 1378 (Fed. Cir. 2004). The requisite direct infringement must be engaged in by someone other than the inducer. *Anton/Bauer, Inc. v. PAG, Ltd.*, 329 F.3d 1343, 1349, 66 USPQ2d 1675 (Fed. Cir. 2003). The standard for showing requisite intent has been somewhat ambiguous, as the Federal Circuit has recently recognized:

Specifically, this court has historically required either a general or a specific level of intent to induce infringement. See *Hewlett-Packard Co. v. Bausch and Lomb, Inc.*, 909 F.2d 1464, 1469 (Fed. Cir. 1990) (“[P]roof of actual intent to cause the

acts which constitute the infringement is a necessary prerequisite to finding active inducement."); see also *Manville Sales Corp. v. Paramount Sys., Inc.*, 917 F.2d 544, 553 (Fed. Cir. 1990) ("The plaintiff has the burden of showing that the alleged infringer's actions induced infringing acts and that he knew or should have known his actions would induce actual infringements.").

Fuji Photo Film Co., Ltd. v. Jazz Photo Corp., 394 F.3d 1368, 1379 (Fed. Cir. 2005). Intent is a factual issue that can be proven through circumstantial evidence. *Water Techs. Corp. v. Calco, Ltd.*, 850 F.2d 660,668 (Fed. Cir.1988) (noting that "circumstantial evidence may suffice" in proving intent).

3. Contributory Infringement

Contributory infringement is defined in section 271(c) of the Patent Act as follows:

(c) whoever offers to sell or sells within the United States or imports into the United States a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention knowing the same to be specially made to or specially adapted for use in the infringement of that patent, and not a staple article or commodity suitable for substantial noninfringing use, shall be liable as a contributory infringer.

35 U.S.C. §271(c). A seller of a component of an infringing product can be held liable for contributory infringement if: (1) there is an act of direct infringement by another person; (2) the accused contributory infringer knows its component is included in a combination that is patented and infringing; and (3) there are no substantial non-infringing uses for the accused component part, *i.e.*, the component is not a staple article of commerce. *Certain Flash Memory Circuits and Products Containing Same*, Inv. No. 337-TA-382, USITC. Pub. 3046, Commission Opinion on the Issues Under Review and on Remedy, the Public Interest, and Bonding at 7 (July 1997) ("*Flash Memory*, Commission Opinion"). Without an act of direct infringement, there can be no

contributory infringement. *Carborundum Co. v. Molten Equip. Innovations, Inc.*, 72 F.3d 872, 876 n.4 (Fed. Cir. 1995); *Zenith Labs, Inc. v. Bristol-Myers Squibb Co.*, 19 F.3d 1418, 1423 n. 5 (Fed. Cir. 1994).

B. The '675 Patent

1. Claim 33

The accused chips do not meet every limitation of claim 33 of the '675 patent. RX-839C at 26. Each of the accused chips has the same architecture with respect to the top plane of the circuit controlled by a REF signal and a bottom plane of the circuit made up of unit current sources. RX-839C at 30; CX-1662C at 34-38. Each unit current source does not generate a unit current proportional to the reference scale current. RX-839C at 26; Gutierrez, Tr. at 1403-04, 1408-09. Each unit current source generates a unit current that is constant and determined "by the number and sizing of the transistors within that group."³⁴ CX-1662C at 30; Gutierrez, Tr. at 1403-04. Rather, the unit currents generated by each of the unit current sources are summed together prior to

³⁴ As Broadcom's Dr. Milor testified, in the accused devices, the current generated by each unit current source is not determined by or even related to the reference scale current but rather is simply a copy of a fixed input current weighted by the transistor configuration of the group:

. . . the magnitude of the current flowing through each group of current sources will be determined by the ratio of the number of individual transistors in the group of current sources to the number of individual transistors in diode-connected transistors M27 and M32 ("m"=10). Thus, the current flowing through each activated group of current sources will be a weighted copy of the 50uA reference current that flows through transistors M27 and M32.

CX-1662C at 30.

being scaled by the reference scale current. RX-839C at 26; CX-1662C at 30-31; Milor, Tr. at 765 ("the unit current sources, in the lower current mirror, these are summed together, and the summing happens when these branches are joined together. And the result goes to the upper current mirror, which causes a reflection and a scaling to generate the reference pump current."); Gutierrez, Tr. at 1405, 1462-63, 1472-73, 1480-81, 1554 (the unit current sources "are either on or off. So when they're on; they have a fixed value of 5 microamperes per transistor, and when they're not on, they're off."). Hence, the accused chips do not literally infringe claim 33.

During the prosecution history of the '675 patent, the applicant clearly and repeatedly characterized the invention as *simultaneously scaling the unit current sources* responsive to the PLL control signal and used this characteristic as one basis to distinguish prior art. Broadcom cannot now reclaim subject matter that was disclaimed during prosecution. Thus, Broadcom has not met its burden to show that the accused transmitter and transceiver chips literally infringe claim 33 of the '675 patent.

As discussed above with respect to the file history of the '675 patent, Broadcom is not entitled to infringement under the doctrine of equivalents with respect to the simultaneous scaling feature as a result of its disclaimer of that subject matter during prosecution.

2. Claim 35

Because claim 35 is dependent from claim 33, without infringement of claim 33 there can be no infringement of claim 35. Staff notes that Dr. Milor and Mr. Gutierrez both testified that claim 35 added nothing significant to claim 33. Gutierrez, Tr. at 1482; Milor, Tr. at 768.

C. The '983 Patent

1. Claim 1

Under the Staff's proposed construction, Qualcomm's accused chipsets directly infringe claim 1. Each accused chip is a "mobile station modem" ("MSM") designed for use in a mobile computing device specifically, a cellular telephone. CX-1664C at 44-45; CX-1534C at QBB073238; JX-119C at 48:12-16. With respect to functional characteristics relevant to the '983 patent, each of the accused chips operates in the same way. CX-1664C at 44. The MSM6250 chipset will be used as a representative chip.

The MSM6250, as well as all of the other accused chipsets, has a lead or connector adapted to receive battery power for at least one of the circuits. CX-1664C at 45-49; Nettleton, Tr. 2542. The accused chipsets contain communication circuitry that can reduce power by controlling the frequency of scanning for access points. CX-1664C at 50-56. Dr. Nettleton's examination of the [] provided by Qualcomm for the MSM6250 chipset shows that the MSM6250 chipset will scan for an access point []. CX-1664C at 51-52. If the chipset has not located an access point []

[]. *Id.* In this way, the MSM6250 chipset controls the frequency of scanning for access points and operates in a reduced power mode by reducing the frequency of access point scanning. Proakis, Tr. at 2201-02. Qualcomm has not rebutted this analysis. RX-922C at 11-13.

The accused chipsets contain communication circuitry suitable for transmitting analog or digital data (but not control signals) to access points using two different methods of communication. The MSM6250 chipset is adapted to transmit data to access points across GSM, GPRS, or WCDMA networks. CX-1664C at 50. Each of the GSM, GPRS, and WCDMA standards require a distinct air interface and constitute a distinct wireless communication method. CX-1664C at 50; Nettleton, Tr. at 2535-36. Qualcomm has not rebutted this analysis. RX-922C at 11-13.

Finally, the accused chipsets contain processing circuitry arranged to process data received from the communication circuitry. CX-1664C at 56-57. For example, the MSM6250 chipset includes an embedded ARM microprocessor to "handl[e] WCDMA 3G wireless applications." CX-1664C at 57, *citing*, CX-94C at QBB068272. Accordingly, the MSM6250 chipset has processing circuitry arranged to handle or process data received from the communication circuitry over the WCDMA link. CX-1664C at 57. Qualcomm has not contested this analysis. RX-922C at 11-13. In sum, the accused chipsets contain each and every limitation of claim 1 of the '983 patent under the Staff's claim construction.³⁵

There is no evidence in the record to suggest that when these chips are incorporated into telephone handsets, they operate any differently. While Qualcomm may argue that telephone manufacturers are able to [

³⁵ With respect to Broadcom's allegations against "form fit accurate" ("FFA") devices, the Staff notes that the allegedly infringing FFAs are made in the United States and have not been shown to be imported, sold for importation, or sold in the United States after importation.

] Qualcomm has put forward no evidence to demonstrate that such changes have in fact occurred. Hutchison, Tr. at 1212-14. Accordingly, under the Staff's construction, telephone handsets incorporating the accused chips also directly infringe claim 1 of the '983 patent. Qualcomm induces this infringement by supporting the handset manufacturers in incorporating the accused chipsets into their handsets and working with handset manufacturers to solve problems in incorporating the accused chipsets into their handset designs. Hutchison, Tr. at 1210-12; Grob, Tr. at 998-99, 1003-04, 1011, 1022; RX-838C at 16; [] Qualcomm's support for the handset manufacturers has continued even after the filing date of the Complaint in this proceeding with full knowledge of both the '983 patent and Broadcom's infringement allegations. *Id.* At a minimum, Qualcomm specifically recommends to handset manufacturers that they implement battery saving features including reducing the frequency of scanning for access points. Grob, Tr. at 1010-11.

2. Claim 4

Claim 4 of the '983 patent reads "[t]he one or more circuits of claim 1 wherein the processing circuitry comprises an integrated circuit."³⁶ JX- at 43:9-10. All of the accused Qualcomm chips are integrated circuits. Proakis, Tr. at 2199; CX-1664C at 58; *see* CDX-67. Hence, the accused chipsets contain each and every limitation of claim 4 of the '983 patent.

For the same reasons, telephone handsets incorporating the accused chips directly infringe claim 4 of the '983 patent. The evidence shows that Qualcomm induces this infringement by

³⁶ The parties have presented no claim construction issues specific to claim 4 of the '983 patent.

supporting the handset manufacturers in incorporating the accused chipsets into their handsets and working with handset manufacturers to solve problems in incorporating the accused chipsets into their handset designs. Hutchsion, Tr. at 1210-12; Grob, Tr. at 998-99, 1003-04, 1011, 1022; RX-838C at 16; []

3. Claim 8

Claim 8 of the '983 patent reads "[t]he one or more circuits of claim 1 wherein the processing circuitry is arranged to provide output to a display and arranged to control the display."³⁷ JX-5 at 43: 22-24. With respect to the representative MSM6250 chipset, the embedded ARM microprocessor provides output to an LCD display and controls the operation of the display. CX-1664C at 59; *see* CDX-68. Qualcomm has not contested this analysis. RX-922C at 11-13. Hence, the accused chipsets contain each and every limitation of claim 8 of the '983 patent.

For the same reasons, telephone handsets incorporating the accused chips directly infringe claim 8 of the '983 patent. The evidence shows that Qualcomm induces this infringement by supporting the handset manufacturers in incorporating the accused chipsets into their handsets and working with handset manufacturers to solve problems in incorporating the accused chipsets into their handset designs. Hutchsion, Tr. at 1210-12; Grob, Tr. at 998-99, 1003-04, 1011, 1022; RX-838C at 16; []

³⁷ The parties have presented no claim construction issues specific to claim 8 of the '983 patent.

4. Claim 9

Claim 9 of the '983 patent reads "[t]he one or more circuits of claim 1 and further comprising a bus suitable for receiving data from a keyboard."³⁸ JX-5 at 43: 25-27. With respect to the representative MSM6250 chipset, the technical documentation shows a bus which can be connected to a keypad via the web controller and KEYSENSE pins and is suitable for receiving data from a keyboard. CX-1664C at 60; *see* CDX-69. Qualcomm has not contested this analysis. RX-922C at 11-13. Hence, the accused chipsets contain each and every limitation of claim 9 of the '983 patent.

For the same reasons, telephone handsets incorporating the accused chips directly infringe claim 9 of the '983 patent. The evidence shows that Qualcomm induces this infringement by supporting the handset manufacturers in incorporating the accused chipsets into their handsets and working with handset manufacturers to solve problems in incorporating the accused chipsets into their handset designs. Hutchison, Tr. at 1210-12; Grob, Tr. at 998-99, 1003-04, 1011, 1022; RX-838C at 16; []

5. Claim 11

Claim 11 reads: "the one or more circuits of claim 1 wherein processing circuitry enables switching from the reduced power mode to an increased power mode of the processing circuitry when the communication circuitry is needed to transmit or receive data." JX-5 at 43:31-35. Broadcom's expert, Dr. Nettleton, opined that the accused chipsets have processing circuitry that

³⁸ The parties have presented no claim construction issues specific to claim 9 of the '983 patent.

can operate over a range of frequencies and that the processing circuitry can dynamically change the frequency of its processing to control the power consumption of the chipset. CX-1664C at 61-62. As Dr. Nettleton explained, the workload of the chipset is greater whenever the chipset is transmitting or receiving data. CX-1664C at 62. The accused chipsets are designed to adapt the clocking rate to account for the reduced or increased work load of the chipset. CX-1664C at 62. In this way, the accused chipsets have processing circuitry that makes it possible to operate in a reduced power mode and an increased power mode depending upon whether the communication circuitry is needed to transmit or receive data. CX-1664C at 62. Considering Dr. Nettleton's proposed claim construction, his analysis is necessarily focused on reduced and increased power modes based on dynamic clock rate switching. Qualcomm has not contested this analysis. RX-922C at 11-13. Since the Staff's proposed construction of claim 11 is broader than Broadcom's, Dr. Nettleton's analysis shows equally well that the accused chipsets meet each and every limitation of claim 11 under the Staff's construction.

For the same reasons, telephone handsets incorporating the accused chips directly infringe claim 11. Qualcomm induces this infringement by supporting the handset manufacturers in incorporating the accused chipsets into their handsets and working with handset manufacturers to solve problems in incorporating the accused chipsets into their handset designs. Hutchison, Tr. at 1210-12; Grob, Tr. at 998-99, 1003-04, 1011, 1022; RX-838C at 16; []

6. Claim 14

Independent claim 14 is directed to "a method for use in a mobile computing device to communicate with access points." JX-5 at 43:43-44. Like apparatus claim 1, claim 14 requires

"reducing the received battery power by controlling the frequency of scanning for the access points."³⁹ JX-5 at 44: 7-8. Broadcom's expert opined that the accused chipset when incorporated into a telephone handset "reduces the received battery power by controlling the frequency of scanning for the access points for the reasons discussed previously in conjunction with claim 1." CX-1664C at 63; *see* CX-1664C at 50-56. Broadcom's entire analysis of controlling the frequency of scanning for access points is restricted to the situation "when there is no access point channel available." CX-1664C at 51, 52 ("no available channel"), 55 ("out of range"), and 56 ("no network signal was detectable"). In the Staff's view, when a cellular handset is out of range of all access points, it may not be said to be practicing a method to communicate with access points. Thus, Broadcom has not met its burden to show that the accused chipsets themselves or when incorporated into a telephone handset practice claim 14 of the '983 patent. Inasmuch as there has been no showing of direct infringement, there cannot be induced infringement.

7. Claim 17

Claim 17 reads "[t]he method of claim 14 wherein the processing data comprises operating at a first frequency and at a second frequency different from the first frequency."⁴⁰ JX-5 at 44:18-20. For the same reasons discussed with respect to claim 14, Broadcom has not met its

³⁹ The parties have presented no claim construction issues specific to claim 14 of the '938 patent other than those discussed previously in connection with claim 1.

⁴⁰ The parties have presented no claim construction issues specific to claim 17 of the '983 patent.

burden to show infringement of claim 17 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

8. Claim 18

Claim 18 reads "[t]he method of claim 17 and further comprising displaying data resulting from the data processing."⁴¹ JX-5 at 44:21-22. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 18 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

9. Claim 19

Claim 19 reads "[t]he method of claim 18 and further comprising receiving data from a keyboard."⁴² JX-5 at 44:23-24. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 19 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

10. Claim 20

Claim 20 reads "[t]he method of claim 14 and further comprising displaying data resulting from the data processing."⁴³ JX-5 at 44:25-26. For the same reasons discussed with respect to

⁴¹ The parties have presented no claim construction issues specific to claim 18 of the '983 patent.

⁴² The parties have presented no claim construction issues specific to claim 19 of the '983 patent.

⁴³ The parties have presented no claim construction issues specific to claim 20 of the '983 patent.

claim 14, Broadcom has not met its burden to show infringement of claim 20 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

11. Claim 21

Claim 21 reads "[t]he method of claim 14 and further comprising receiving data from a keyboard.." ⁴⁴ JX-5 at 44:27-28. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 21 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

12. Claim 22

Claim 22 reads "[t]he method of claim 14 wherein the processing data comprises processing at a plurality of different frequencies." ⁴⁵ JX-5 at 44:29-30. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 22 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

13. Claim 23

Claim 23 reads:

The method of claim 14 and further comprising:

reducing the received battery power when the transmitting of data or the receiving of data is not needed; and

⁴⁴ The parties have presented no claim construction issues specific to claim 21 of the '983 patent.

⁴⁵ The parties have presented no claim construction issues specific to claim 22 of the '983 patent.

increasing the received battery power when the transmitting of data or the receiving data is needed.⁴⁶

JX-5 at 44:31-35. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 23 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

14. Claim 24

Claim 24 reads "[t]he method of claim 23 wherein the reducing the received battery power comprises reducing the frequency of the processing and wherein the increasing the received battery power comprises increasing the frequency of the processing." JX-5 at 44:36-40. For the same reasons discussed with respect to claim 14, Broadcom has not met its burden to show infringement of claim 24 with respect to the accused chipsets or telephone handsets incorporating the accused chipsets.

D. The '311 Patent

1. Claim 1

Direct Infringement

Each of the accused Qualcomm MSM chips is capable of supporting the EV-DO standard.⁴⁷ CX-1664C at 87; Grob, Tr. at 996-97. With respect to functional characteristics

⁴⁶ The parties have presented no claim construction issues specific to claim 23 of the '983 patent.

⁴⁷ An MSM chipset by itself can not practice any of the asserted claims of the '311 patent because the claims require "a network consisting of base stations, mobile terminals and network infrastructure." RX-838C at 14-15. The MSM chipsets themselves "play no part at all in the
(continued...)

relevant to the '311 patent, each of the accused MSM chips operates in the same way. CX-1664C at 87.

Under the Staff's proposed construction, there is direct infringement of claim 1 when at least two cellular telephone handsets, each containing an accused chipset, operate on a cellular network in accordance with 1x EV-DO protocols. There are numerous 1x EV-DO cellular telephone network providers in the United States including Alltel, Midwest Wireless, ACS Wireless and Sprint. CX-1664C at 89; JX-122C at 15, 23. Cellular phones incorporating the accused chipsets such as the Audiovox's CDM-8940, Samsung's MM-A920, A900, and MM-A940, Sanyo's 7500 and 9000, UT Starcom's PPC-6700, and Motorola's RZR V3C are used on 1x EV-DO networks in the United States. CX-1664C at 89; JX-122C at 51, 53-55, 62; JX-124C at 31, 36; Grob, Tr. at 981-84. Such networks constitute communication networks supporting wireless communication of messages in accordance with the preamble of claim 1. CX-1664C at 88-89.

The 1x EV-DO communication network has at least one telephone handset (first terminal node) with a wireless receiver in a fully powered ("normal") state capable of receiving messages and another telephone handset (second terminal node) with a wireless receiver in a powered-down (power-saving or sleep) state but capable of receiving messages at periodic intervals. [

] CX-1664C at 89-91. Under the 1x EV-DO protocol, compliant phones may

⁴⁷(...continued)

'access point' and it is the behavior of the access point that is the primary focus of the independent claims, claim 1 and 16, asserted by Broadcom." RX-838C at 15.

enter into a battery-conserving sleep state in which the phone, including the receiver circuitry, largely just turns off and only periodically powers up to monitor whether it has a pending phone call or message coming in. []; Grob, Tr. at 981-84; RX-843C at 7-8.

The 1x EV-DO network access point will attempt to deliver messages to the node with the powered-up receiver at the first opportunity and will attempt to delivery messages to the node with the powered-down receiver by transmitting a paging message that identifies a message-waiting delivery. CX-1664C at 91-92. Specifically, when a handset is in a Default Connected State, a traffic channel is open between the phone and the base station to allow messages to be transmitted. CX-1664C at 92; RX-838C at 18; []. After completion of the transmission, the channel will remain open and the wireless receiver in the handset will remain powered up for a period of time. CX-1664C at 92; RX-838C at 18. If a second message is transmitted prior to the traffic channel being closed, the transmission of the second message will occur immediately over the open channel with no handshaking needed between the access point and the handset. Grob, Tr. at 995-96; CX-1664C at 92; []. Thus, the network meets the limitation that an access point attempts to immediately deliver messages destined for the phone with the fully powered receiver (first terminal node).

The EV-DO standard sets forth a Default Idle State Protocol in which the network access points transmit a synchronous capsule at predetermined intervals. CX-1664C at 95; Grob, Tr. at 980; CX-600 at 2743. The synchronous capsule contains messages including paging messages indicating that a message awaits delivery for a sleeping terminal. CX-1664C at 95; RX-838C at 17-18; JX-32 at 83. In the [] 1x EV-DO network, there is a [] that

contains information that indicates to the mobile phone whether there are calls or other messages waiting. [] In this way, the network meets the limitation that an access point attempts to deliver messages destined for the sleeping phone (second terminal node) by transmitting beacons at predetermined intervals that indicate that a message awaits delivery. CX-1664C at 94-96.

The sleeping handset will synchronize the sleep-wake states of the receiver with the network in order to receive the paging messages from the access point. CX-1664C at 96-97.

Indeed, a sleeping handset on the [

]. If there is no message waiting for that mobile phone, it goes back to sleep. []. If there is a message waiting, the mobile phone responds according to protocol and thus directs further operation of its receiver to receive the message. []; Grob, Tr. at 988; RX-838C at 17-18; RX-843C at 8. [

]. Once a traffic channel is open, the message is delivered. []; Grob, Tr. at 992-94.

In sum, a network as described above practices each and every limitation of claim 1 of the '311 patent under the Staff's proposed construction. *See generally* CDX-94.

Induced Infringement

Qualcomm induces direct infringement of claim 1 of the '311 patent by urging and supporting the development and adoption of 1x EV-DO networks that use 1x EV-DO compliant phones containing the Qualcomm accused chipsets. As discussed above, the 1x EV-DO standard

employs certain features that result in direct infringement. Qualcomm makes chips that are compliant with 1x EV-DO including the MSM 5500, MSM6500, MSM6800, and MSM7500. Grob, Tr. at 996-97. Qualcomm engages handset manufacturers and network providers in partnership to ensure that these features function properly in the 1x EV-DO milieu.

Specifically, during the design process for a new phone, Qualcomm establishes a cooperative design partnership with its vendors to ensure that the Qualcomm chips are correctly designed into the products. Grob, Tr. at 1003-04, 1022. Similarly, [

]. Qualcomm provides

a panoply of support services to vendors and network providers including, for example:

- field testing with MSM chips that are compliant with 1x EV-DO. Grob, Tr. 998-99.
- providing software allowing the MSM chips to implement the functions required by the EV-DO specification. RX-838C at 16.
- providing software and firmware updates for their chips. Grob, Tr. at 1003; [

].
- making its personnel available to answer questions regarding Qualcomm chips. [

].
- providing troubleshooting services to network providers and telephone manufacturers to identify and solve problems relating to at least 1x EV-DO phones using Qualcomm chips.

[

].

Hence, Qualcomm actively induces the use of the accused chips in 1x EV-DO compliant phones and the operation of such phones on an 1x EV-DO network in an infringing manner.

In addition, Qualcomm's activities regarding the promotion of 1x EV-DO networks and phones have continued since Qualcomm had actual notice of the '311 patent. Indeed, since March 30, 2005, Qualcomm has continued to operate test beds using 1x EV-DO compliant chips for the benefit of all service providers.⁴⁸ Grob, Tr. at 1011, 1021-22.

2. Claim 2

Claim 2 of the '311 patent reads:

The communication network of claim 1 wherein the first terminal node selectively operates in one of the normal mode and a power saving state and while operating in the power saving state the first terminal node synchronizes operation of its wireless receiver to receive the beacons from the access point.

JX-3 at 20:10-15. The evidence shows direct infringement of claim 2 for the same reasons stated with respect to claim 1. The first terminal node is an 1x EV-DO compliant telephone handset with its wireless receiver in a fully powered ("normal") state capable of receiving messages. This may be accomplished by the handset being attached to the network with an open traffic channel, *i.e.*, downloading an internet page. All 1x EV-DO compliant handsets are capable of operating either in the connected state or the default idle state. RX-838C at 21; CX-1664C at 99. While operating in the power saving default idle sleep state, the handset synchronizes operation of its wireless

⁴⁸ A test bed is a network with terminals and equipment that is not for commercial use, does not have paying subscribers, necessarily, and the purpose of which is to evaluate performance and functionality and so forth. Grob, Tr. at 1000.

receiver to receive the beacons from access points just like the claimed sleeping second terminal node. CX-1664C at 99; *see* CDX-95.

3. Claim 3

Claim 3 of the '311 patent reads:

The communication network of claim 1 wherein the second terminal node directs further operation of its receiver to receive the message during a time period that follows one of the received beacons.

JX-3 at 20:16-19. The evidence shows direct infringement of claim 3 for the same reasons stated with respect to claim 1. In the connection setup state of the 1x EV-DO protocol, there is a protocol for opening a traffic channel between the handset and the base station. Grob, Tr. at 988-89, 991; RX-838C at 17-18; RX-843C at 8; CX-1664C at 100. This protocol includes the handset transmitting a connection request message to the access network after receiving the paging message. RX-838C at 17-18; RX-843C at 8; CX-1664C at 100. The network then transmits a traffic channel assignment. RX-838C at 17-18. The handset then sends an acknowledgment to the network and connects to the assigned traffic channel. Once the handset has successfully sent and received an acknowledgment to the network over the traffic channel, the handset is in the connected state ready to receive data from the network. RX-843C at 8. In this way, the "second terminal node" directs further operation of its wireless receiver to receive the message after the received beacon. CX-1664C at 100; *see* CDX-96.

4. Claim 4

Claim 4 of the '311 patent reads:

The communication network of claim 3 wherein the time period immediately follows the one of the received beacons.

JX-3 at 20:20-22. As described above, when a handset receives a paging message indicating that it has a message waiting, the handset transitions from the sleep state through the connection set-up state into the default connected state in accordance with the 1x EV-DO protocol. CX-1664C at 101. The construction of "immediately" in claim 4 should be consistent with its construction in claim 1 within the phrase "attempts to immediately deliver." *Phillips*, 415 F.3d at 1314-15; *Southwall*, 54 F.3d at 1579. Using a consistent construction, the transmission of a message does occur at the first opportunity consistent with routine protocols although, as discussed above, data transmission does not proceed instantaneously after the beacon is received. *See* CDX-97. Hence, Broadcom has shown infringement.⁴⁹

5. Claim 5

Claim 5 of the '311 patent reads:

The communication network of claim 3 wherein the time period follows the one of the received beacons during an awake time window.

JX-3 at 20: 23-25. Both experts agreed at trial that an awake time window is simply the period when a receiver is awake to receive messages. Specifically, Dr. Proakis, Qualcomm's expert, testified with regard to the Mobitex specification that the awake time window was "the period the

⁴⁹ Under Qualcomm's construction of "immediately," Broadcom has not shown that the message is received in the time period immediately following the beacon.

mobile stays awake" and "the time that it takes for the message to be delivered." Proakis, Tr. at 1896-98. Dr. Nettleton testified that the "awake time window" begins when the handset transmits the connection request to the network and ends when the handset and network have finished exchanging messages. CX-17664C at 102. Using this agreed-upon construction, mobile handsets on a 1x EV-DO network practice this limitation. CX-1664C at 102; *see* CDX-98.

6. Claim 7

Claim 7 of the '311 patent reads:

The communication network of claim 3 wherein the second terminal node has a wireless transmitter that is used to request the message awaiting delivery.

JX-3 at 20: 29-31. Handsets operating on the 1x EV-DO network contain wireless transmitters that power up to request a message awaiting delivery. CX-1664C at 103; JX-124C at 15, 38-39. Hence, the claim is practiced by using such a handset on an 1x EV-DO network. *See* CDX-99.

7. Claim 8

Claim 8 of the '311 patent reads:

The communication network of claim 5 wherein the second terminal node has a wireless transmitter that is used to request that the message awaiting delivery be delivered during the awake time window.

JX-3 at 20:32-35. Handsets operating on the 1x EV-DO network meet this limitation for the same reasons discussed with respect to claims 5 and 7 above. *See* CX-1664C at 104; *see also* CDX-100.

8. Claim 13

Claim 13 of the '311 patent reads:

The communication network of claim 3 wherein the second terminal node synchronizes operation of its wireless receiver to receive the beacons from the

access point even when one or more of the beacons from the access point have not been received.

JX-3 at 20:54-58. Broadcom argues that in the 1x Ev-DO protocol, a mobile phone will not receive all paging messages. CX-1664C at 105; JX-24 at 100. The control channel cycle lasts 5.12 seconds and is divided up into twelve time slots. *Id.* As discussed above, a handset on the 1x EV-DO network wakes up every 5.12 seconds to listen for paging messages or "beacons" on the control channel. Clearly, the handset cannot listen to the paging messages sent on all twelve of the time slots or it would never sleep. Therefore, the handset necessarily misses one or more paging messages or "beacons" in every cycle. Nonetheless, the handset receiver remains synchronized to receive the beacons intended for it. CX-1664C at 105; *see* CDX-101.

As noted in the claim construction section, this claim covers a system that is robust enough to be able to maintain synchronization with the base station even if one of the expected beacons is missed. Broadcom's infringement analysis does not address this requirement of the claim. Thus, Broadcom has not met its burden of proof to show infringement of claim 13 under the correct construction by a preponderance of the evidence.

9. Claim 14

Claim 14 of the '311 patent reads:

The communication network of claim 1 wherein the second terminal node comprises a battery-powered, roaming device.

JX-3 at 20:59-61. A mobile phone operating on a 1x EV-DO network is a battery powered roaming device. CX-1664C at 106; *see* CDX-102.

10. Claim 16

Independent claim 16 reads:

A communication network supporting wireless communication of messages, said communication network comprising:

a first terminal node operating in a first state;

a second terminal node operating in a second state in which attempts are made to minimize power consumption by the wireless receiver;

a bridging node having a wireless transceiver to support wireless communication to the first and second terminal nodes:

the bridging node attempts to deliver messages destined fro the second terminal node by transmitting at predetermined intervals beacons that identify a message awaiting delivery;

the second terminal node synchronizing operation of its wireless receiver to receive the beacons from the bridging node and determining from the received beacons that it has a message awaiting delivery and responding to an awaiting message by directing further operation of its wireless receiver to receive the message; and

the bridging node delivering messages to the first terminal node without requiring the first terminal node to determine from the beacons that it has messages awaiting delivery.

JX-3 at 20:65 - 21:22. For the reasons discussed with respect to claim 1, each and every limitation of claim 16 is practiced when at least two cellular telephone handsets, each containing an accused chipset, operate on a cellular network in accordance with 1x EV-DO protocols. CX-1664C at 106-10; *see* CDX-103.

11. Claim 17

Claim 17 of the '311 patent reads:

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The communication network of claim 16 wherein the second terminal node directs further operation of its receiver to receive the message during a time period that follows one of the received beacons.

JX-3 at 23-26. The evidence shows direct infringement of claim 17 for the same reasons stated with respect to claim 3. CX-1664C at 111; *see* CDX-104.

12. Claim 18

Claim 18 of the '311 patent reads:

The communication network of claim 17 wherein the time period immediately follows the one of the received beacons.

JX-3 at 21:27-29. Handsets operating on the 1x EV-DO network meet this limitation for the same reasons discussed with respect to claim 4 above. *See* CX-1664C at 111; *see also* CDX-105.

13. Claim 19

Claim 19 of the '311 patent reads:

The communication network of claim 17 wherein the time period follows the one of the received beacons during an awake time window.

JX-3 at 21:30-32. Handsets operating on the 1x EV-DO network meet this limitation for the same reasons discussed with respect to claim 5 above. *See* CX-1664C at 112-13; *see also* CDX-106.

V. DOMESTIC INDUSTRY

As a prerequisite to finding a violation of Section 337, Complainants must establish that "an industry in the United States, relating to the articles protected by the patent . . . concerned, exists or is in the process of being established." 19 U.S.C. §1337(a)(2). The domestic industry requirement of Section 337 consists of two prongs: the technical prong and the economic prong.

Certain Variable Speed Wind Turbines and Components Thereof, Inv. No. 337-TA-376, USITC Pub. 3003, Comm'n Opinion at 14-17 (1996).

- A. “Technical Prong” (*i.e.*, practice of a patent claim by the domestic industry product(s))

The test for claim coverage for purposes of the "technical prong" of the domestic industry requirement is the same as that for infringement.⁵⁰ *Certain Microlithographic Machines and Components Thereof*, Inv. 337-TA-468, Initial Determination (unreviewed in relevant part) at 63 (Public Version April 1, 2003) ("*Microlithographic Machines*"), citing *Certain Doxorubicin and Preparations Containing Same*, Inv. No. 337-TA-300, Initial Determination at 109 (May 21, 1990), *aff'd*, Views of the Commission at 22 (October 31, 1990). "It is sufficient to show that the domestic industry practices any claim of that patent" *Microlithographic Machines*, at 64, citing *Certain Microsphere Adhesives, Process for Making Same, and Products Containing Same, Including Self-Stick Repositionable Notes*, Inv. No 337-TA-366, Commission Opinion at 7-16 (January 16, 1996).

1. The '675 Patent

Dr. Gomez, Dr. Milor, and Qualcomm's expert, Mr. Gutierrez all testified that Broadcom's BCM3440 tuner chip contains each and every element of claim 33 of the '675 patent. Gutierrez, Tr. at 1509-10; CX-1337C at 12; CX-1662C at 58; CX-40C; *see* CDX-16. The BCM3440 has a [

⁵⁰ In its pre-hearing brief, Qualcomm did not contest Broadcom's assertion that it satisfies the technical prong of the domestic industry requirement with respect to any of the asserted patents.

]. Accordingly, the

BCM3440 tuner chip practices claim 33 of the '675 patent.

2. The '983 Patent

Public Version

The BCM2132 baseband processor chip is designed to operate within mobile phones and is currently used in the Treo 650 Smartphone. CX-1664C at 71; CX-1667C at 5. The BCM2132 chip is capable of communicating on the GSM, GPRS, and EDGE protocol standards. CX-1664C at 71-72; CX-1667C at 3, 4. [

]. In this way, the communication circuitry and the entire phone reduces power consumption. CX-1664C at 71; CX-1667C at 6. [

]. Broadcom has shown that the BCM2132 chip meets each and every limitation of claim 1 of the '983 patent under the Staff's proposed construction.⁵¹ CX-1664C at 70; *see* CDX-66.

3. The '311 Patent

Broadcom's wireless LAN solutions are used in desktop and laptop computers, printers, routers, and other consumer electronics. CX-1338C at 3. When Dell, Hewlett Packard, Apple, or Motorola purchase a Broadcom wireless LAN solution, it receives the chip itself as well as all of the software necessary to run the product. CX-1338C at 3. Prior to commercial sale, Broadcom tests its wireless LAN products to ensure that conformity to the IEEE 802.11 standards. CX-1338C at 5. In this regards, Broadcom conducts both []. CX-1338C at 5. Broadcom's "System Verification Testing Group," or "SVT group" simulates an IEEE 802.11 communication network using []. CX-1338C at 5. [

⁵¹ While Broadcom has alleged that certain other of its baseband products also practice the '983 patent, Broadcom has not provided detailed analyses for these other products. However, practice of the '983 patent by the BCM2132 product is sufficient to satisfy the technical prong of domestic industry.

]. Hence, during this system testing, the BCM4317 processor chips and the BCM4712 router chips in association with each other practice each and every limitation of claim 1 of the '311 patent.⁵²

The SVT Group's test scenarios are designed to operate in the same way as a customer's system. CX-1338C at 6. For example, [

⁵² While Broadcom has not provided such a detailed analysis of the testing performed on the BCM4318 or BCM4320 wireless LAN solutions, there is nothing in the record to indicate that either the testing or the results would be any different.

] Hence, the BCM4317 processor chips after being incorporated into consumer products (such as printers) and during actual operation in a IEEE 802.11 network practice each and every limitation of claim 1 of the '311 patent.

B. “Economic Prong” (*i.e.*, the economic factors set forth in 19 U.S.C. § 1337(a)(3))

The Commission has decided not to review the Judge's Initial Determination granting Broadcom's unopposed motion for partial summary determination with respect to the economic prong of domestic industry for each of the patents at issue. Order No. 19 (January 24, 2006).

VI. VALIDITY/INVALIDITY

A. Legal Principles

1. Arguments under 35 U.S.C. § 102

Anticipation is a question of fact that must be established by clear and convincing evidence. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047, 34 USPQ2d 1565, 1567 (Fed. Cir. 1995); *Scripps Clinic and Research Found. v. Genentech Inc.*, 927 F.2d 1565, 1576, 18 USPQ2d 1001, 1016 (Fed. Cir. 1991). A patent claim is anticipated, and therefore invalid, if a single prior art reference discloses each and every limitation of the claim. *C.R. Bard v. M3 Systems*, 157 F.3d 1340, 1349, 48 USPQ2d 1225, 1229 (Fed. Cir. 2000); *Celeritas Technologies, Ltd. v. Rockwell Int'l*, 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1521 (Fed. Cir. 1998). The disclosure need not be express, but may anticipate by inherency where such inherency would be appreciated by a person of ordinary skill in the art. *EMI Group North America, Inc. v. Cypress Semiconductor Corp.*, 268 F.3d 1342, 1350-51, 60 USPQ2d 1423, 1429-30 (Fed. Cir. 2001); *Standard Havens Prod., Inc. v. Gencor Indus., Inc.*, 953 F.2d 1360, 1369, 27 USPQ2d 1321, 1328 (Fed. Cir. 1991).

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The law of anticipation does not require that the reference "teach" the subject matter of the patent; rather, it is only necessary that the claims being challenged, as construed by the court, "read on" something disclosed in the reference. Thus, the question of whether a reference "teaches away" from the invention is inapplicable to an anticipation analysis. *Celeritas*, 150 F.3d at 1361, 47 USPQ2d at 1522. Indeed, a reference that discloses all limitations will anticipate the claimed invention even if that reference disparages the subject matter of the claim. *See Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1378, 58 USPQ2d 1508, 1515 (Fed. Cir. 2001).

Determining what is prior art relative to the anticipation analysis is accomplished by reference to section 102 of the Patent Act, the provisions of which are set forth immediately below:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

* * *

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

* * *

(e) (2) the invention was described in . . . a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent

* * *

Public Version

(g)(2) before such person's invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed or concealed it.

Subsection 102(a) includes within the prior art knowledge, use, patents, and publications that predate the applicant's invention within the prior art. *Markhur v. C.R. Bard Inc.*, 79 F.3d 1572, 1576, 38 USPQ2d 1288 (Fed. Cir. 1996). "Knowledge" must be publicly accessible and sufficient to enable one with ordinary skill in the relevant art to reduce the disclosed invention to practice. *Minnesota Mining & Mfg. Co. v. Chemque, Inc.*, 303 F.3d 1294, 1301, 1306, 64 USPQ2d 1270 (Fed. Cir. 2002) (3M).

An invention is considered patented for prior art purposes under section (a) as of the date when the patent was both available to the public and conferred legal rights, whether in the United States or a foreign country. *Ritter v. Rohm & Hass Co.*, 271 F.Supp. 313, 154 USPQ 518 (S.D.N.Y. 1967); *In re Monks*, 588 F.2d 308, 200 USPQ 129 (CCPA 1978). The written description of the invention, whether disclosed in a patent or in a publication created for and accessible to the public in a tangible form, must be enabling. *PPG Indus. Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1556, 37 USPQ2d 1618 (Fed. Cir. 1996).

Section 102(b) promotes prompt filing by inventors. *Woodland Trust v. Flowertree*, 148 F.3d 1368, 1371 (Fed. Cir. 1998). Accordingly, subsection (b) bars a patent if the invention was patented or described in a printed publication anywhere or "in public use or on sale" in the United States more than one year prior to the filing date of the application for a patent. *Id.* A "public use" is a use more than a year before the patent filing date, whereby a completed invention is used in public, without restriction and in circumstances other than "substantially for the purposes of

experiment." *See Allied Colloids Inc. v. Cynamid Co.*, 64 F.3d 1570, 1574 (Fed. Cir. 1995). An inventor's own prior commercial use may constitute a public use under 102(b) and bar the inventor from obtaining a patent. *TP Laboratories v. Professional Positioners, Inc.*, 724 F.2d 965, 972 (Fed. Cir. 1984) (public use may bar patent "if inventor is making commercial use of the invention under circumstances which preserve its secrecy"). However, the secret use of an invention by a third party will not bar a patent under section 102(b) if that prior use or knowledge is not available to the public. *W.L. Gore & Assocs. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983) (third party secret commercial activity, more than one year before the patent application of another, is not a Section 102(b) bar).

Two conditions must be met for an on-sale bar to apply: the invention must have been the subject of a commercial offer for sale, and the invention must have been ready for patenting. *Pfaff v. Wells Elecs. Inc.*, 525 U.S. 55, 67-68, 48 USPQ2d 1641 (1998). The Supreme Court has held that the ready for patenting requirement "may be satisfied in at least two ways: by proof of reduction to practice before the critical date; or by proof that prior to the critical date the inventor had prepared drawings or other descriptions of the invention that were sufficiently specific to enable a person skilled in the art to practice the invention." *Id.* The Federal Circuit has held that an offer for sale "must meet the level of an offer for sale in the contract sense, one that would be understood as such in the commercial community." *Group One, Ltd. v. Hallmark Cards, Inc.*, 254 F.3d 1041, 1047 (Fed. Cir. 2001) (internal quotations omitted). In analyzing whether a commercial offer exists for the on sale bar, the courts must look to the Uniform Commercial Code

("UCC") and the Restatement of Contracts to determine whether a communication or series of communications rises to the level of a commercial offer for sale. *Id.*⁵³

Under subsection (e), an issued U.S. patent can bar issuance of a later patent. For an application by a different entity, information in a patent application published by the PTO and information in a patent issued by the PTO are available prior art as of the earliest effective U.S. filing date of the application. *Riverwood International Corp. v. R.A. Jones & Co.*, 324 F.3d 1346, 1355-57, 66 USPQ2d 1331 (Fed. Cir. 2003).

Section 102(g) provides that a person is not entitled to a patent if “before such person’s invention thereof, the invention was made in this country by another inventor who had not abandoned, suppressed, or concealed it.” An inventor can establish that she was the first to invent under §102(g) by demonstrating either that she was the first to reduce the invention to practice or that she was the first to conceive of the invention and then, prior to the other party’s conception, exercised reasonable diligence in reducing the invention to practice. *Union Carbide Chemicals & Plastics Technology Corp. v. Shell Oil Co.*, 64 USPQ2d 1545 (Fed. Cir. 2002); *see also Griffin v. Bertina*, 285 F.3d 1029, 1032, 62 USPQ2d 1431, 1433 (Fed. Cir. 2002). “To prove actual reduction to practice, an inventor must establish that he actually prepared the composition and knew it would work.” *Estee Lauder Inc. v. L’Oreal, S.A.*, 129 F.3d 588, 592, 44 USPQ2d 1610, 1613 (Fed. Cir. 1997). Priority of invention under 102(g) and its constituent issues of conception

⁵³ The Federal Circuit notes that the Supreme Court cites the Restatement of Contracts and the UCC with approval in the commercial contract law contexts. *Group One, Ltd. v. Hallmark Cards, Inc.*, 254 F.3d 1041, 1047-48 (Fed. Cir. 2001)

and reduction to practice are questions of law predicated on subsidiary factual findings. *Singh v. Brake*, 65 USPQ2d 1641, 1645 (Fed. Cir. 2003), *citing Brown v. Barbacid*, 276 F.3d at 1317, 1332, 61 USPQ2d 1236, 1238 (Fed. Cir. 2002); *Hitzeman v. Rutter*, 243 F.3d 1345, 1353, 58 USPQ2d 1161, 1166 (Fed. Cir. 2001).

2. Arguments under 35 U.S.C. § 103

Under Section 103, a patent is valid unless "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103. The ultimate determination of obviousness is a question of law, but "it is well understood that there are factual issues underlying the ultimate obviousness decision." *Richardson-Vicks Inc. v. The Upjohn Co.*, 122 F.3d 1476, 1479 (Fed. Cir. 1997).

After construing the claims, the next step in an obviousness inquiry is to determine whether the claimed invention would have been obvious as a matter of law, based on underlying factual inquiries, including the *Graham* factors: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed invention and the prior art; and (4) secondary considerations, or objective indicia of nonobviousness. *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 662-63 (Fed. Cir. 2000), *citing Graham v. John Deere Co.*, 383 U.S. 1, 17-18, 148 USPQ 459, 461 (1966). The Supreme Court has stated:

Courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements. . . . A patent for a combination which only united old elements with no

change in their respective functions . . . obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men

Sakraida v. AG Pro, Inc., 425 U.S. 273, 281 (1976), *quoting Great A and P Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 152 (1950); *see also Anderson's-Black Rock v. Pavement Co.*, 396 U.S. 57, 62 n. 4 (1969) ("Absent here is the element 'new.' For as we have said, the combination patent added nothing to the inherent characteristics or function of the radiant-heat burner."); *Hotchkiss v. Greenwood*, 52 U.S. 248, 267 (1850).

The patent challenger must also demonstrate that "there is a reason, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the references, and that would also suggest a reasonable likelihood of success." *Ruiz*, 234 F.3d at 664-65. The motivation to combine or modify may be "derived from the prior art reference itself . . . from the knowledge of one of ordinary skill in the art, or from the nature of the problem to be solved." *SIBIA Neurosciences, Inc. v. Cadus Pharmaceutical Corporation*, 225 F.3d 1349, 1356 (Fed. Cir. 2000) (internal citations omitted); *see also Motorola, Inc. v. Interdigital Tech.*, 121 F.3d 1461, 1472 (Fed. Cir. 1997) ("The suggestion to combine may come from the prior art, as filtered through the knowledge of one skilled in the art."). Finding a motivation or suggestion to combine is an underlying factual question that is subsidiary to the ultimate conclusion on obviousness. *SIBIA*, 225 F.3d at 1356.

"Secondary considerations," also referred to as "objective indicia of nonobviousness," include commercial success, long felt but unsolved needs, and failure of others, are relevant as evidence of obviousness or nonobviousness. *Graham*, 383 U.S. at 17-18.

3. Arguments under 35 U.S.C. § 112

Written Description

It is well-settled law that "claimed subject matter 'need not be described *in haec verba*' in the specification to satisfy the written description requirement." *University of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 923, 69 USPQ2d 1886, 1892 (Fed. Cir. 2004) ("*Rochester*"), quoting *In re Smith*, 481 F.2d 910, 914, 178 USPQ 620 (CCPA 1973). Rather, written description is a question of fact, namely, whether the disclosure allows "one skilled in the art to visualize or recognize the identity of the subject matter purportedly described." *Rochester*, 69 USPQ2d at 1892, quoting *Enzo Biochem Inc. v. Gen-Probe, Inc.*, 323 F.3d 956, 968, 54 USPQ2d 1915 (Fed. Cir. 2002).

Enablement

The purpose of the enablement requirement of 35 U.S.C. § 112(1) is to ensure that the inventor provides sufficient information about the claimed invention so that a person of ordinary skill in the art at the time could make and use the invention without undue experimentation. *PPG Indus., Inc. v. Guardian Indus. Corp.*, 75 F.3d 1558, 1563-65 (Fed. Cir. 1996); *In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993); *Scripps Clinic and Research Foundation v. Genentech*, 927 F.2d 1565, 1571, 18 USPQ2d 1001, 1006 (Fed. Cir. 1991). The enablement requirement does not forbid all experimentation in order for a person to practice the claimed invention, but it does forbid "undue experimentation." *National Recovery Technologies, Inc. v. Magnetic Separation Systems, Inc.*, 166 F.3d 1190, 1197 (Fed. Cir. 1999). Whether certain experimentation is undue is a legal question that depends on the underlying facts of each case. *Id.*

Enablement is determined from the viewpoint of persons of ordinary skill in the field of the invention at the time the patent application was filed. *Ajinomoto Co., Inc. v. Archer-Daniels-Midland Co.*, 228 F.3d 1338, 1345, 56 USPQ2d 1332 (Fed. Cir. 2000). Consequently, an enabling specification must provide the novel aspects of the invention, but does not have to describe information that was well known to one skilled in the art. *Genentech, Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366 (Fed. Cir. 1997). The enablement requirement is met if the description enables any mode of making or using the invention. *Engel Indus., Inc. v. The Lockformer Co.*, 946 F.2d 1528, 1533, 20 USPQ2d 1300 (Fed. Cir. 1991).

Every patent has a presumption of validity, including the presumption that the patent complies with the requirements of §112. *National Recovery Technologies, supra*, 166 F.3d at 1195. The challenger must prove invalidity for lack of enablement by clear and convincing evidence. *Id.*

Indefiniteness

Section 112, paragraph 2, reads as follows:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C. §112, ¶ 2. In order to satisfy the definiteness requirement, a patent claim must particularly point out and claim the invention, *i.e.*, provide a clear and definite meaning to one of ordinary skill in the art in light of the specification. *Miles Laboratories, Inc. v. Shandon Inc.*, 997 F.2d 870, 874-75, 27 USPQ2d 1123, 1126 (Fed. Cir.), *cert. denied*, 114 S.Ct. 943 (1994). If a claim read in light of the specification reasonably apprizes one of ordinary skill in the art, that

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claim satisfies § 112, ¶ 2. *Id.* In contrast, where the claim is not sufficiently precise to permit a potential competitor to determine whether or not there is infringement, that claim is invalid for failure to satisfy the definiteness requirements of § 112, ¶ 2. *Morton Int'l v. Cardinal Chemical Co.*, 5 F.3d 1464, 28 USPQ2d 1190 (Fed. Cir. 1993) (claims at issue not sufficiently precise to enable a competitor to determine whether or not he is infringing), *citing Amgen, Inc. v. Chugai Pharmaceutical Co.*, 927 F.2d 1200, 1218, 18 USPQ2d 1016, 1030 (Fed. Cir. 1991) (Nothing in the specification, file history, or prior art provided any indication as to what the range of specific activity is covered by the term “about,” hence patent invalid under § 112, ¶ 2 as indefinite); *Amgen, Inc. v. Hoechst Marion Rousell, Inc.*, 126 F.Supp.2d 69, 156-57, 57 USPQ2d 1449 (D.Mass. 2001) (where specification disclosed several different preparation methods, each of which would lead to different quantitative results, and applicant did not specify the preparation method that should be used, claim is indefinite as well as non-descriptive (126 F.Supp.2d at 155) and non-enabled (126 F.Supp.2d at 165)).

B. The ‘675 Patent

1. Anticipation Arguments Under 35 U.S.C. § 102(a) or (b)

a. The BCM-3415-A1

According to inventor Gomez, the BCM-3415-A1 chip had a gain compensator circuit including a plurality of unit current sources arranged into groups in which each group is responsive to a corresponding capacitor control signal and generates a portion of the reference pump current when the group is activated. RX-839C at 20-21; JX-9 at BCMITC00073897; Gutierrez, Tr. at 1414-15; Milor, Tr. at 1604. The BCM-3415-A1 also had a capacitor control

signal that controls a corresponding fixed capacitor. RX-839C at 20-21; JX-9 at BCMITC00073897; Gutierrez, Tr. at 1415; Milor, Tr. at 1604. During the prosecution, the applicant stated that the BCM-3415-A did not have "the feature of simultaneous scaling the unit current sources responsive to a PLL control signal that represents characteristics of the PLL." JX-9 at BCMITC00073897. However, under Dr. Milor's construction of claim 33, the BCM-3415-A had [

]. Gutierrez, Tr. at 1417-19.

As exemplified in RX-199 and RDX-109, the BCM-3415-A1 has [

]. However, upon cross-examination, the only reason for Dr. Milor's opinion was that the embodiment described in the patent specification had both a PLL control signal and a VCO select signal. Milor, Tr. at 1612. Indeed, Dr. Milor admitted:

Q: If the patent had not included a discussion of VCO select signals, there would be no question in your mind that a VCO select signal of this sort meets all your -- all the requirements for your definition of a PLL control signal; right?

A. That's correct.

Milor, Tr. at 1613. Hence, aside from the particular choice of signal naming employed in the preferred embodiment in the '675 patent specification, Dr. Milor had no rational basis for her opinion that the VCO select signal was not a PLL control signal. Instead, the evidence supports a conclusion that VCO select is a PLL control signal. Thus, the BCM-3415-A1 has a reference scale current, [] generated in response to a PLL control signal by one or more weighted current sources in a current mirror.

The unit current sources arranged into groups are [

]. The current generated by the unit current sources in the active group is [].

When activated, the unit current sources generate a portion of the reference pump current.

Gutierrez, Tr. at 1415. Hence, under Broadcom's construction, the BCM-3415-A1 practices every limitation of claim 33 of the '675 patent.⁵⁴

However, Qualcomm has not shown by clear and convincing evidence that the BCM-3415-A1 was offered for sale or sold more than one year prior to the March 20, 2001 filing date of the '675 patent application. As disclosed in the patent prosecution history, Broadcom issued a press

⁵⁴ Qualcomm has shown that the [] However, under the Staff's proposed construction, *each* of the unit current sources must be simultaneously scaled to the reference current. Qualcomm has not undertaken an examination of [] to show by clear and convincing evidence that *each* of the unit current sources [] is simultaneously scaled to the reference scale current.

release stating that the BCM-3415-A1 was available and could be had for \$10 in sample quantities. JX-9 at BCMITC0000073903. However, promotional materials generally do not meet the standard for a commercial offer for sale under Federal Circuit precedents. *Group One*, 254 F.3d at 1047 (“We do note in passing that contract law traditionally recognizes that mere advertising and promoting of a product may be nothing more than an invitation for offers, while responding to such an invitation may itself be an offer.”), citing *Restatement (Second) of Contracts* § 26, comment b (1981); see also *Mesaros v. United States*, 845 F.2d 1576, 1581 (Fed. Cir. 1988) (“Thus, if goods are advertised for sale at a certain price, it is not an offer, and no contract is formed by the statement of an intending purchaser that he will take a specified quantity of the goods at that price.” Rather, this is merely an invitation to enter into a bargain) (citation omitted).

Likewise, Qualcomm has not shown by clear and convincing evidence that there was public use of the BCM-3415-A1 prior to March 20, 2000. While potential customers may have been able to obtain a sample of the chip, it was not available commercially. Moreover, the evidence shows that some customers received samples of the chip in a reference board for evaluation purposes subject to confidentiality agreements. This does not rise to the level of clear and convincing evidence to invalidate a patent.

b. U.S. Patent No. 5,625,325 (“Rotzoll”)

A prior art reference cannot anticipate a claim if an element of that claim is not expressly disclosed unless such an element is inherent in, or "necessarily present in" the thing described. *Continental Can Co. USA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991); *MEHL/Biophil Int'l Corp., v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999). According to

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Qualcomm's own expert, Rotzoll does not expressly or inherently show "a plurality of unit current sources that are arranged into at least one group, said group responsive to a capacitor control signal and generating a portion of the reference pump current when said group is activated." Indeed, Rotzoll does not disclose unit current sources at all. Gutierrez, Tr. at 1523. Specifically, Rotzoll shows a black-box analog-to-digital converter that *could* be implemented as an array of unit current sources arranged into groups. RX-839C at 32-33; Gutierrez, Tr. at 1518-19, 1559; CX-1978C at 11. Similarly, Rotzoll does not show a current mirror that includes one or more weighted current sources even though one *could* build a D-to-A converter using a current mirror. Gutierrez, Tr. at 1520, 1559; Milor, Tr. at 1581-82; CX-1978C at 11. Similarly, one *could* configure the Rotzoll circuit to match claim 33 as interpreted by Dr. Milor. Gutierrez, Tr. at 1413. However, it is not sufficient that using the patent claim for guidance, one *could* implement it using the prior art. *Continental Can Co. UA, Inc. v. Monsanto Co.*, 948 F.2d 1264, 1268-69 (Fed. Cir. 1991) (a reference that is silent about an asserted characteristic anticipates only if "the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.")

2. Obviousness Arguments Under 35 U.S.C. § 103(a)

VCOs with switched capacitors to tune the oscillator over a range of frequencies were known in the art. RX-839C at 10; RX-694. Gain compensation circuits that adjusted the charge pump current to counteract variations in VCO gain were known in the art. RX-839C at 11; RX-690, 709. Nevertheless, Qualcomm has not shown by clear and convincing evidence that the asserted claims of the '675 patent could have been obvious based on either the BCM-3415-A1, the

Rotzoll patent, or any combination of one or more of references related to "gain compensation" with one or more of the references showing "switched capacitor VCO." The novel feature of the '675 patent is the combination of these two concepts and the addition of a scaling feature based on a PLL control signal. RX-839C at 12. Qualcomm's expert, Mr. Gutierrez, has not opined on obviousness. RX-839C. Qualcomm has not identified any motivation to combine any of the references to make a gain compensator having every element of claims 33 and 35 of the '675 patent.

3. Arguments Under 35 U.S.C. § 112

The claims of the '675 patent have not been shown to be invalid for lack of enablement. Although a portion of the specification appears to be erroneous, Qualcomm has not engaged in any analysis that making the claimed invention in light of the error would constitute undue experimentation for one of ordinary skill in the art.. QCAB at 84; *see also Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1070-71 (Fed. Cir. 2005); *Atlas Powder Co. v. E.I.DuPont De Nemours & Co.*, 750 F.2d 1569, 1576 (Fed. Cir. 1984). Rather, Mr. Gutierrez testified that "if [he] built it the first time, I would have done it wrong." Gutierrez, Tr. at 1507. This does not apply the correct standard. Without more, Qualcomm has not shown by clear and convincing evidence that one of ordinary skill in the art would require undue experimentation to make the claimed invention.

The standard of indefiniteness is "somewhat high," that is, a claim is not indefinite merely because its scope is not ascertainable from the face of the claims. *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1342 (Fed. Cir. 2003). If the meaning of the claim is discernible,

“even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds.” *Exxon Research & Eng’g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001). A claim is indefinite under §112 ¶ 2 only if it is “insolubly ambiguous, and no narrowing construction can properly be adopted.” *Id.*

Here, Qualcomm's expert, Mr. Gutierrez did not believe the term "PLL control signal" to be incapable of understanding or hopelessly ambiguous. Gutierrez, Tr. at 1495-96. When asked to identify and define the PLL control signal in Figure 8, without hesitation he testified that "a PLL control signal is a signal that changes the characteristics of the PLL." Gutierrez, Tr. at 1389. Mr. Gutierrez testified "I think we agree that a PLL control signal is anything that controls a PLL characteristic." Gutierrez, Tr. at 1394. Again, Mr. Gutierrez was able to determine that a VCO select signal was "definitely" a PLL control signal. Gutierrez, Tr. at 1395, 1415, 1417. Thus, Qualcomm has not met its burden of showing by clear and convincing evidence that a person of ordinary skill in the art would not be able to understand the meaning of the claim.

C. The ‘983 Patent

1. Anticipation Arguments under 35 U.S.C. § 102(a) or §102(b)

a. GSM Technical Specification

Qualcomm has not shown by clear and convincing evidence that the Global System for Mobile Communications ("GSM") Technical Specification anticipates the asserted claims of the '983 patent. According to Qualcomm, Ms. Marie-Bernadette Pautet is one of the most knowledgeable people in the world about the operation of GSM. CX-828 at 8. On cross-

examination, Ms. Pautet repeatedly testified that in the GSM system there is only one radio interface or air interface that is used for all communications between a mobile device and a base station. CX-828 at 8; Pautet, Tr. at 1720-21, 1734-36, 1753, 1798, 1801-02. This single radio interface is the only method of communication between the mobile station and a base station. Pautet, Tr. at 1721, 1787-88. Neither the GSM technical specification nor the GSM system itself anticipates the asserted claims under the Staff's proposed construction of the asserted claims as requiring two communication methodologies. Likewise, neither the GSM technical specification nor the GSM system itself anticipates the asserted claims under Broadcom's proposed construction of the asserted claims as requiring two air interfaces.

b. Draft 0 of the CDMA Digital CAI Standard

Qualcomm has not shown by clear and convincing evidence that Draft 0 of the CDMA Digital CAI Standard (RX-491C) was ever made available to the public to qualify as a printed publication under Section 102(b). Although it is dated July 31, 1990, the cover states:

QUALCOMM PROPRIETARY
REPRODUCTION PROHIBITED

RX-491C at QBB138614 and QBB138615. The cover also contains the warning at the very end of the document:

All data and information contained in or disclosed by this document is confidential and proprietary information of Qualcomm, Inc. and all rights therein are expressly reversed. By accepting this material the recipient agrees that this material and the information contained therein is held in confidence and in trust and will not be used, copied, reproduced in whole or in part, nor its contents revealed in any manner to others without the express written permission of Qualcomm, Inc.

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Id. Every page of the document bears the labels "Qualcomm Proprietary" and "For Internal Review Only." RX-491C at QBB138616-138830. The document also has another warning:

CONTROLLED DOCUMENT
DO NOT REPRODUCE - CONTACT SECURITY
MUST BE PROTECTED AT ALL TIMES
DO NOT DISSEMINATE OR DIVULGE WITHOUT APPROVAL

Id. at QBB138831. To the extent that Qualcomm argues this document is a conception under 35 U.S.C. §102(g), this is addressed below.

c. U.S. Patent No. 4,964,121 ("Moore")

Qualcomm has not met its heavy burden of proving by clear and convincing evidence that the Moore reference discloses every limitation of the asserted claims as properly construed. For example, with respect to the first and second wireless communications, Qualcomm's expert, Dr. Proakis, has identified only one communication technology. RX-838C at 86. The Moore patent states that "the invention is not limited to any particular messaging format and may comprise *one* of the many formats available in the art." *Id.* Hence, Qualcomm has not identified either the two air interfaces required under Broadcom's construction or the two wireless technologies required under the Staff's construction.

d. U.S. Patent No. 5,203,020 ("Sato")

Qualcomm has not shown by clear and convincing evidence that the Sato reference discloses every limitation of the asserted claims as properly construed. For example, with respect to the first and second wireless communications, Qualcomm's expert has only identified a single

air interface in the reference, not the two air interfaces required under Broadcom's construction or the two wireless technologies required under the Staff's construction. RX-838C at 79.

e. U.S. Patent No. 5,128,938 ("Borras")

Likewise, Qualcomm has not met its heavy burden of proving by clear and convincing evidence that the Borras reference discloses every limitation of the asserted claims as properly construed. For example, Qualcomm's expert has not identified the requisite two air interfaces under Broadcom's construction or two wireless technologies under the Staff's construction. RX-838C at 73-74.

2. Anticipation Arguments Under 35 U.S.C. §102(g)

Qualcomm argues that the July 31, 1990 Draft 0 of the CDMA CAI specification evidences a prior conception, presumably of unnamed Qualcomm employees, of the claimed invention which was followed by diligence in attempting to reduce to practice the idea of a "sleep mode." RX-838C at 59-60. Section §102(g) states that a person is not entitled to a patent if the invention was previously made in this country "*by another inventor*" who had not abandoned, suppressed or concealed it.⁵⁵ 35 U.S.C. §102(g)(2). Qualcomm has not identified any actual inventor of the "sleep mode" disclosed in the 1990 CDMA CAI. If the alleged prior inventors are unidentified

⁵⁵ An "inventor" must be a natural person. *Beech Aircraft Corporation v. EDO Corp.*, 990 F.2d 1237, 1248 n.23, 26 USPQ2d 1572 (Fed. Cir. 1993). In 1999, Section 102(g) was amended specifically to add the word "inventor" such that under the current section 102(g) the invention must be made "*by another inventor*." There is no legislative history to explain the change in the statutory language.

Qualcomm employees, there is no independent corroboration of Qualcomm's prior invention or reduction to practice.⁵⁶

3. Obviousness Arguments Under 35 U.S.C. § 103(a)

In his expert reports, Qualcomm's expert Dr. Proakis did not identify any combination of references that he contended contained every element of the asserted claims and therefore was precluded from offering such opinions at trial. Tr. at 1866-69; 2271-72. Thus, in the absence of any expert analysis regarding the disclosures of the prior art and motivation to combine these references, Qualcomm must rely on attorney argument. In this case, Qualcomm has not shown by clear and convincing evidence that any of the asserted claims of the '983 patent are invalid for obviousness.

4. Arguments Under 35 U.S.C. § 112

Qualcomm has not shown that the '983 patent is invalid for lack of enablement or a written description of "scanning for access points," as that claim element should be construed. *See, e.g.*, JX-5 at Fig. 13-16. Figures 11 and 14 of the '983 patent illustrate how a terminal can roam from one access point to another, and in so doing, disconnect from one access point and reconnect with another. CX-1339C at 8. Figure 15 shows a similar process but includes a retry counter that decreases the frequency of scanning for access points to decrease power drain. CX-1339C at 8.

⁵⁶ On November 16, 1993, there was a Qualcomm e-mail claiming that "minor sleep success" had been achieved inasmuch as a phone had slept and "is being left to run through the night (hopefully)." RX-528C. There is no subsequent documentation that the phone actually operated in the hoped for manner overnight. Hence, it is not even clear whether there was an actual reduction to practice on November 16, 1993.

Consequently, the evidence does not establish that persons of ordinary skill in the art would not understand the invention or be able to practice it.

D. The '311 Patent

1. Anticipation Arguments Under 35 U.S.C. § 102(a) or §102(b)

a. Mobitex Terminal Specification

Qualcomm has not met its heavy burden of proving by clear and convincing evidence that the Mobitex Terminal Specification is prior art to the '311 patent. Although Mr. Fraser was a credible witness, his testimony by itself fails to rise to the level of clear and convincing evidence given the absence of any documentary evidence whatsoever to corroborate his memory from more than fifteen years ago regarding the public distribution of Cantel's Mobitex Terminal Specification including the battery saving protocol prior to December 31, 1990.

b. The COGNITO System

Qualcomm has not met its heavy burden of proving by clear and convincing evidence that the COGNITO System contains every limitation of the asserted claims and that the COGNITO System qualifies as prior art to the '311 patent.⁵⁷ Specifically, Qualcomm has not identified first and second terminal nodes and has not identified any differences in the manner in which messages are sent or received by the first and second terminal nodes. CX-1979C at 64-65.

c. GSM Technical Specification

⁵⁷ The Staff notes that Qualcomm's expert Dr. Proakis only provides an opinion with respect to claims 16-19 of the '311 patent. RX-838 at 47-51.

Qualcomm has not shown by clear and convincing evidence that the GSM Technical Specification meets every limitation of the asserted claims. For example, claim 1 requires specific operating states for the wireless receivers in the terminal nodes. JX-3 at 19:60-63. Claim 16 requires the terminal node to attempt to minimize power consumption of the wireless receiver. JX-3 at 21:2-4. The GSM Technical Specification may disclose a terminal node that may be able to operate in a power saving state but it does not disclose circuit level aspects of the wireless receiver of such a terminal node such as are required by the '311 patent claims. *See* CX-1979C at 58. Hence, Qualcomm has not shown that the GSM Technical Specification expressly or inherently discloses every limitation of the asserted claims of the '311 patent.

d. CDMA CAI Draft Specifications

As discussed above, Qualcomm has not shown by clear and convincing evidence that the Draft 0 of the CDMA Digital CAI Standard (RX-491C) was ever made available to the public or otherwise qualifies as a printed publication under Section 102(b).

2. Anticipation Arguments under 35 U.S.C. § 102(g)

Qualcomm's prehearing brief does not address section 102(g) with respect to the '311 patent. Hence, under Ground Rule 8.2 any argument with respect to this defense has been abandoned or withdrawn.

3. Obviousness Arguments Under 35 U.S.C. § 103(a)

Qualcomm has not met heavy burden of proving by clear and convincing evidence that any asserted claim as properly construed is obvious. Qualcomm's expert has provided no obviousness analysis for the '311 patent. In the absence of any expert analysis regarding the disclosures of the

prior art and motivation to combine these references, Qualcomm must rely upon attorney argument. In this case, Qualcomm has not shown by clear and convincing evidence that any of the asserted claims of the '311 patent are invalid for obviousness.

4. Arguments Under 35 U.S.C. § 112

Qualcomm has not met its burden to show that claims 7 and 8 of the '311 patent are invalid for lack of written description. These claims require that the second terminal node use a wireless transmitter to request the message awaiting delivery. The disclosure of this mechanism can be found in the appendices to the patent:

The SLEEPING node "requests" the message by notifying its parent that it is awake. A terminal learns that it must request [an] unsolicited saved message by examining the pending message list in the HELLO.response packet.

JX-8 at BCMITC00000726. These appendices were incorporated by reference into the patent specification. JX-3 at BCMITC000023894-95. Accordingly, Qualcomm has not met its burden of proof to show invalidity under section 112 by clear and convincing evidence.

Respectfully submitted,

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Public Version

**Certain Baseband Processor Chips and Chipsets, Transmitter
and Receiver (Radio) Chips, Power Control Chips, and
Products Containing Same, Including Cellular Telephone Handsets**

Inv. No. 337-TA-543

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on April 19, 2006, the Commission Investigative Staff caused the foregoing public version of the **Posthearing Brief of the Commission Investigative Staff** to be filed with the Secretary, served upon Hon. Charles E. Bullock (2 copies), and served on the following as indicated:

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